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A REVIEW OF THE LABROID FISHES AND RELATED FORMS FOUND IN THE WATERS OF JAPAN.

BY

DAVID STARR JORDAN

AND

JOHN OTTERBEIN SNYDER,

Of the Leland Stanford Junior University.

From the Proceedings of the United States National Museum, Vol. XXIV, pages 595-662.

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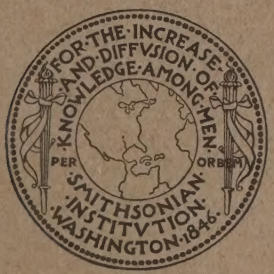

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A REVIEW OF THE LABROID FISHES AND RELATED FORMS FOUND IN THE WATERS OF JAPAN.

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In the present paper is given a review of the species of Pharyngognathus fishes (Pomacentridæ, Labridæ, and Scaridæ) known to inhabit the waters of Japan. It is based on the collections made by the writers in the summer of 1900, under the auspices of the Hopkins Seaside Laboratory of Stanford University. Series of the species obtained have been deposited in the United States National Museum. The authors are indebted to Mr. Michitaro Sindo for important aid in the comparison of specimens.

In the descriptions the length of the head is measured from tip of snout to posterior border of opercle, the soft opercular flap not taken into account. The length of the snout is the distance between the tip of upper jaw, including the teeth, and the anterior edge of the orbit. The first anal spine is in some cases so very small that it is difficult to see with the unaided eye. The scales of the lateral series are counted to base of caudal rays, those on the fin not considered. On the cheek the scales are counted in series between eye and angle of preopercle. The accompanying illustrations are by Chloe Lesley Starks and Charles Bradley Hudson.

Family I. POMACENTRIDÆ.

Body short, deep, compressed, covered with ctenoid scales of varying size; lateral line wanting posteriorly; mouth small, usually with rather strong teeth, either conic or incisor-like; vomer and palatines toothless; nostril single on each side, nearly round; preopercle with its posterior edge largely free, serrate or entire; preorbital sheathing the small maxillary; dorsal fin single, with numerous strong spines, the spinous portion longer than the soft, which is similar to the soft anal, both fins scaly at base; anal spines 2; ventral fins thoracic, I, 5, the anterior rays longest, usually filamentous; a scaly appendage at base of ventral. Lower pharyngeals fully united; branchiostegals 5

to 7; gills 3½, the slit behind the last gill very small or obsolete; gill rakers rather long and slender; no labyrinthiform appendage; air bladder and pseudobranchiæ present, well developed; pyloric cæca 2 or 3; gill membranes free from the isthmus. Vertebræ 12+14=26. Fishes of the tropical seas, similar in mode of life to the Chætodontidæ, feeding on small marine animals and plants in the coral reefs. Most of them are too small to be used as food. They are very active in life and the coloration is usually brilliant, sometimes changing much with age. The family shows strong affinities with the Labridæ in its gill structures and pharyngeals. In other respects it approaches the Kyphosidæ, while the unique character of the simple nostril is shared with the Cichlidæ only, from ancestors of which group the Pomacentridæ are probably descended.

I. Scales moderate or large, 25 to 50 in lengthwise series.
  a. Teeth fixed, conical or incisor-like, covering nearly the whole free edge of each jaw; carnivorous species.
    b. Teeth conical, not flattened nor incisor-like.
      c. Teeth in one series; preorbital and all the opercular bones serrate, the teeth on the opercle and interopercle very strong; dorsal spines 9 to 11; scales small (about 50) ..... *Amphiprion*, 1.
      cc. Teeth in 2 to 4 series, the outer enlarged and bluntish; preopercle entire; scales large; body oblong; lateral line wanting on tail; scales large; dorsal spines 12 or 13 ..... *Chromis*, 2.
    bb. Teeth more or less flattened or incisor-like, in 1 or 2 series.
      d. Preopercle and usually preorbital also, sharply serrate.
        e. Teeth entire, mostly uniserial; preorbital not very deep, its edge not notched; scales large; dorsal spines 12 or 13 ..... *Pomacentrus*, 3.
      dd. Preopercle and preorbital strictly entire; snout naked; suborbitals not adnate to the cheeks.
        e. Teeth not emarginate, arranged in two series ..... *Chrysiptera*, 4.
        ee. Teeth emarginate or Y-shaped, in one series; preorbital moderate; scales large; dorsal spines 12 or 13 ..... *Glyphisodon*, 5.

1. AMPHIPRION Schneider.

Amphiprion Schneider, Syst. Ichth. Bloch, 1801, pp. 47, 200 (*ephippium*).
Prochilus (Klein, Pisces Missus, V, p. 60, nonbinomial.) Bleeker, Maatsch. Wet., II, 1877, p. 20 (*ephippium*).

Body short and deep, covered with rather small roughish scales, about 50 in a longitudinal series; preorbital serrate, without large spine; all the opercular bones strongly serrate; teeth in one row, small, conical; dorsal spines 9 to 11. Coloration bright, with usually one or more sharply defined bluish white cross bands. Tropical seas, abounding about coral reefs.

(ἀμφι, everywhere; πρίων, saw.)

a. Dorsal rays IX, 19; one broad, pearl-colored cross band, on the head and nape. *frenatus*, 1.
aa. Dorsal rays X, 16; three pearl-colored bands on head and body ..... *polymnus*, 2.

1. AMPHIPRION FRENATUS Brevoort.

Amphiprion frenatus Brevoort, Exped. Japan, 1856, p. 263, pl. VI, fig. 4; Nafa, Okinawa Islands, Riukiu Archipelago.—Gill, Proc. Acad. Nat. Sci. Phila., 1859, p. 148; Shimoda.—Jordan and Snyder, Proc. U. S. Nat. Mus., 1900, p. 752; Okinawa, Shimoda.

Amphiprion tricolor Ishikawa, Prel. Cat., 1897, p. 31; Riukiu, not of Günther.

Head $3\frac{1}{2}$ in length; depth $1\frac{9}{10}$; depth of caudal peduncle 6; eye $3\frac{1}{2}$ in head; interorbital space $2\frac{2}{4}$; snout $3\frac{1}{2}$; D. IX, 19; A. II, 15; scales in lateral line 46; in series between lateral and insertion of dorsal 7; between lateral line and insertion of anal 20.

Body short, deep, and compressed; head rounded anteriorly, the snout short; interorbital space convex. Mouth almost vertical, the lower jaw projecting; maxillary not extending to eye, suborbital with a strong spine on anterior part, posterior to which is a row of shorter spines; preopercle strongly serrate; opercle, interopercle, and subopercle with radiating ridges which end in sharp spines. Gill-rakers on first arch about 17, long and slender near middle of arch, growing very short toward the ends.

Head and body covered with ctenoid scales; a naked area on interorbital space, snout, and chin; very small scales extending outward on dorsal, anal, and caudal fins. Lateral line incomplete, ending below base of eleventh dorsal ray. Fourth dorsal spine longest, $2\frac{1}{5}$ in head; posterior rays of dorsal and anal longest, $1\frac{2}{3}$ in head. Caudal rounded, $1\frac{1}{6}$ in head. Pectorals and ventrals rounded.

Color in spirits, bright chocolate brown without bands or stripes, lighter below, in the region of the pectoral fins and on snout and chin; a sharply defined bluish-gray collar bordered by a narrow band of pearly white and this in turn by brownish black, the width about equal to diameter of orbit, passing upward from the subopercle, behind the eye and over the back, just anterior to base of first dorsal spine. Fins yellowish, the spine of ventral brown.

This description is of a specimen about 92 millimeters long from Okinawa. Two other specimens taken at Shimoda by Mr. Morrow, of Commodore Perry's expedition, were also examined. These were the basis of Gill's account of *Amphiprion frenatus*, a species originally described from Okinawa. They have the body of a pale, yellowish-brown color with 3 light lateral bands extending along the sides, wider apart and broader anteriorly, converging and becoming narrower on the caudal peduncle; many scales of the body have each a small light spot. The width of the light collar varies somewhat in each individual. The Shimoda specimens measure as follows: Depth 0.56 of length, scales 7–48–20, D. IX, 19, A. II, 14; depth 0.60, scales 7–47–20, D. IX, 17, A. II, 14.

Though these specimens differ somewhat in color and in the depth of body, they probably all belong to the same species. From *Amphiprion macrostomus*, the most nearly related species, described by

Bleeker, they differ in having but 9 dorsal spines; in form and color they differ but little, save that in the latter the anal and ventrals are blackish, not yellow. The name *frenatus* was used prior to that of *macrostomus*.

(*frenatus*, with a bridle.)

2. AMPHIPRION POLYMNUS Linnæus.

Perca polymna Linnæus, Syst. Nat., 10th ed., I, 1758, p. 291; Indies.

Amphiprion polymnus Bloch and Schneider, Syst. Ichth., 1801, p. 203.—Steindachner, Ichth. Mitth., VII, 1861, p. 79.—Bleeker, Holl. Maats., 1877, p. 28; Sumatra, Nias, Singapore, Bangkok, Java, Celebes, Flores, Solor, Amboyna, Ceram, Banda, Goram, Philippines, etc.

Sparus mylius Bory, Dict. Classique, pl. cxiii.

Amphiprion chrysopterus Cuvier and Valenciennes, Hist. Poiss., V, 1836, p. 301; locality unknown.—Günther, Cat. Fish., IV, 1862, p. 8.

Amphiprion xanthurus Cuvier and Valenciennes, Hist. Poiss., V, 1830, p. 402; Ile de France.—Günther, Cat. Fish., IV, 1862, p. 5; Batavia.—Ishikawa, Prel. Cat., 1897, p. 31; Kii, Riukiu.

Anthias clarkii Bennett, Fishes Ceylon, 1830, p. 29; Ceylon.

Amphiprion clarkii Cuvier and Valenciennes, Hist. Poiss., IX, 1833, p. 504.—Günther, Cat. Fish., IV, 1862, p. 5; Amboina, Singapore, Mozambique, China.—Day, Fishes India, I, p. 378.

Amphiprion japonicus Schlegel, Fauna Japonica, 1846, p. 66; Nagasaki.—Richardson, Ichth. China, 1846, p. 254; Canton.

Amphiprion chrysargurus Richardson, Ichth. China, 1846, p. 254; Canton.

Amphiprion milii Thiollière, Fauna Woodlark, p. 198; Woodlark Island.

Amphiprion bicinctus Playfair, Fishes Zanzibar, p. 80; Zanzibar.

Amphiprion boholensis Cartier, Phys. Soc. Wurzburg, V, p. 96.

D. X, 16; A. II, 14; scales in lateral series 55; in transverse series 6+19.

Ground color brown or black, with three pearl-colored cross bands, the last around the tail; thorax and chin, pectoral, ventral, and caudal fins yellow; dorsal fin black. The dorsal fin is scarcely notched and has the spines stout and short. The height of the body is rather less than one-half of the total length (caudal not included); the caudal fin is emarginate. (Günther.)

We have not seen this species and adopt the views of Dr. Bleeker and Dr. Günther as to its synonymy. The species must be rare in Japan, having been taken only at Nagasaki and in the province of Kii.

The variations in color indicating local or other varieties have been indicated as follows:

a. Ventrals and anal yellow: *polymnus.*
aa. Ventrals and anal dusky or black; pectoral half black: *chrysargurus.*
aaa. Ventrals yellow; anal black: *clarkii.*
aaaa. All the fins black: *boholensis.*
aaaaa. Ventrals and anal edged with black: *japonicus.*

In case these forms should prove distinct species, the Japanese form would stand as *Amphiprion japonicus.*

(*polymnus*, a classical proper name; πολύς, many; ὕμνος, song.)

2. CHROMIS Cuvier.

Chromis CUVIER, Mémoires du Mus. d'Hist. Nat., 1815 (*chromis*).
Heliases CUVIER and VALENCIENNES, Hist. Nat. Poiss., V, 1830, p. 495 (*insolatus*).
Furcaria POEY, Memorias Cuba, II, 1860, p. 194 (*puncta=multilineatus*).
Ayresia COOPER, Proc. Cal. Ac. Sci., 1863, p. 73 (*punctipinnis*).
Heliastes GÜNTHER, corrected spelling.

Body oblong or ovate, the depth two-fifths to two-thirds the length of the body without caudal. Preopercle entire, or nearly so; lateral line wanting on tail. Mouth small; teeth conical, in 2 or more series, the outer series enlarged and blunt. Scales rather large, 24 to 30 in a longitudinal series; suborbital and lower jaw scaly. Dorsal fin with 12 to 14 spines and 9 to 14 soft rays; caudal more or less forked, the lobes rounded or acute. Branchiostegals normally 5. Pyloric cæca 2. Gillrakers long and slender. Tropical seas; species numerous, varying considerably in form, perhaps divisible into smaller genera.

(χρόμις, the ancient name of some fish, probably a Sciænoid, from χρέμω, to neigh, from the noise made by the fish.)

3. CHROMIS NOTATUS (Schlegel).

SUZUMEDAI (SWALLOW TAI); ABURA UWO (OILY-FISH); DOGORO (FOOLISH); GONGORO (FOOLISH).

Heliastes notatus SCHLEGEL, Fauna Japonica, 1846, p. 66; Nagasaki.—GÜNTHER, Cat. Fish., IV, 1862, p. 63; Canton.—ISHIKAWA, Prel. Cat., 1897, p. 30; Misaki, Boshu, Kii.
Chromis notatus JORDAN and SNYDER, Proc. U. S. Nat. Mus., 1900, p. 358; Tokyo; Proc. U. S. Nat. Mus., 1900, p. 755; Tsushima, Yokohama.

Head 3½ in length; depth 2 1/10; depth of caudal peduncle 7; eye 3⅕ in head; interorbital space 3⅓; snout 3⅓; maxillary 3⅔; D. XIII, 12; A. II, 10; scales in lateral series 25; between lateral line and insertion of dorsal 3; between lateral line and insertion of anal 10.

Body ovate, the contour somewhat arched anterior to dorsal fin, a slight elevation over eye, the ventral outline less curved than the dorsal. Interorbital space convex; preorbital narrow, its width contained 3½ times in the orbit. Mouth very oblique, the maxillary extending to a vertical between anterior edge of orbit and pupil. Teeth in narrow bands on anterior part of jaws, the bands narrowing to a single row of close-set teeth posteriorly, the outer series somewhat enlarged and curved. Pseudobranchiæ prominent. Gill rakers on first arch 10+20, slender, compressed and close set. Edges of preopercle and opercle entire.

Head and body completely covered with large, weakly ctenoid scales; rather elongate, minute scales extending far out on the membranes of dorsal, anal, and caudal fins. Lateral line incomplete, ending below insertion of soft dorsal. Fourth to fifth or sixth dorsal spine longest, 1⅓ in head; middle rays of soft dorsal longest, filamentous,

extending, when depressed, to middle of caudal. Second anal spine strong, equal in length to longest dorsal spine. Longest anal rays extending a little beyond base of caudal; 2 or 3 sharp spines on upper and lower edge of base of caudal, the fin deeply notched, the upper and lower lobes somewhat filamentous, the length contained 3 times in head and body. Upper rays of pectoral longest, gradually becoming shorter to the lowest. Ventrals pointed, the outer ray longest, filamentous.

Color in spirits, brownish, the color becoming more intense on upper parts, especially along base of dorsal fin and also near base of anal; silvery on breast and lower part of head; axil blackish, the color extending over the upper part of base of pectoral, forming a conspicuous dark blotch; inconspicuous, narrow, dark lines, one on each row of scales, extending along sides of body; dorsal and anal blackish toward the tips, the basal part and the last 2 or 3 rays yellowish white; middle rays of caudal and the upper and lower edge of the fin light, the other parts dark brownish; pectorals and ventrals dusky. In a small, highly colored example the under parts are strongly suffused with orange, the bases of dorsal and anal; the last 2 rays of the same fins, the middle rays of the caudal, and its upper and lower edge are bright orange.

In life the ground color is steel-violet.

This little fish is very abundant throughout southern Japan in the bays and about rocks. It is used as food, though from its small size held in low esteem, as the name *Dogoro* indicates. Our specimens are from Tokyo, Misaki, Enoshima, Onomichi, Kobe, Wakanoura, Hiroshima, Tsushima, and Nagasaki.

(*notatus*, spotted.)

3. POMACENTRUS Lacépède.

Pomacentrus Lacépède, Hist. Nat. Poiss., IV, 1803, p. 508 (*pavo*); (teeth biserial, soft dorsal short, often elevated; caudal deeply forked, teeth truncate).

Pristotis Rüppell, Neue Wirbelthiere Fische, 1837, p. 128 (*cyanostigma*) (= *Pomacentrus*).

Pseudopomacentrus Bleeker, Verh. Holl. Maats. Weten., II, 1877, p. 40 (*littoralis*); (teeth rounded; preorbital notched; caudal lunate).

Parapomacentrus Bleeker, Nat. Verh. Holl. Maats. Weten., II, 1877, p. 65 (*polynema*); (teeth uniserial; lower jaw scaly; snout scaly; spinous dorsal with membrane incised and lobed).

Amblypomacentrus Bleeker, Nat. Verh. Holl. Maats. Weten., II, 1877, p. 68 (*breviceps*); (snout and lower jaw naked).

Eupomacentrus Bleeker, Nat. Verh. Holl. Maats. Weten., II, 1877, p. 73 (*lividus*); (snout scaly; lower jaw naked; membranes of spinous dorsal not notched; teeth uniserial).

Brachypomacentrus Bleeker, Nat. Verh. Holl. Maats. Weten., 1877, p. 73 (*albifasciatus*); (as above; membrane of spinous dorsal deeply notched).

Body ovate, or oblong, compressed, the profile steep, usually rounded. Head moderate, nearly as deep as long, the snout scaly,

the lower jaw scaly or naked. Mouth quite small, terminal, the jaws equal; each jaw armed with one or two close-set series of compressed, immovable teeth, which are truncate or rounded at tip, sometimes a few small teeth behind these. Gill rakers long; preopercle more or less serrate; preorbital serrate. Scales large, strongly ctenoid, the lateral line running parallel with the back to near the end of the dorsal fin, at which point it ceases. Dorsal fin continuous, with 12 or 13 low stout spines; membrane of spinous dorsal, usually not deeply incised nor lobed, the soft part more or less elevated, its last rays gradually shortened; lower limb of preopercle usually more or less scaly; preorbital narrow, without deep notch; anal fin similar to soft dorsal, with 2 spines, of which the second is much the larger; soft rays 12 to 16; dorsal spines with a sheath of large scales, the membranes of both dorsal and anal covered high up with small scales; caudal fin more or less forked, the lobes rounded; lower pharyngeals triangular; branchiostegals 5 or 6. Species numerous in the tropical seas; extremely variable in form and color, the brilliant coloration apparently dependent on surroundings.

(*πῶμα*, opercle; *κέντρον*, spine.)

a. Body rather elongate, the depth less than half the length to base of caudal; caudal fin deeply forked, with filamentous tips; preorbital and lower jaw naked.

b. Dorsal rays XIII, 11; anal II, 11; scales 27; a dark spot above gill opening ..... *violascens*, 4.

bb. Dorsal rays XIII, 14; anal II, 14; scales 25; color largely deep blue. *celestis*, 5.

aa. Body rather deep, about half length in adult; caudal fin slightly concave, the lobes rounded; preorbital and jaws naked; dorsal rays XIII, 15; anal II, 15; scales 25; young with a large ocellus edged before with white, on the soft dorsal ..... *tripunctatus*, 6.

4. POMACENTRUS VIOLASCENS Bleeker.

Pristotis violascens Bleeker, Journ. Ind. Arch., II, 1848, p. 637; Sumbawa.

Pomacentrus violascens Bleeker, Natuurk. Tyd. Ned. Ind., VI, p. 318; XII, p. 222.—Günther, Cat. Fish., IV, 1862, p. 20; Sumbawa, Nias.—Bleeker, Holl. Maatsch. Vet., 1877, p. 46; Nias, Sumbawa, Flores, Buro, Amboyna, Ceram.

Dascyllus xanthurus Bleeker, Amboyna, III, 1853, p. 117; Nias.

Pomacentrus taniurus Karoli, Prodr. Pisc. As. Or., 1882, p. 27; Hirado. (No description; probably not of Bleeker, whose species, from Amboyna, has the caudal lobes dark.)

Pomacentrus rathbuni Jordan and Snyder, Proc. U. S. Nat. Mus., 1900, p. 754; near Yokohama.

Head 3½ in length; depth 2⅓; depth of caudal peduncle 6⅘; eye 2⅔ in head; snout 4; interorbital space 3; maxillary 3; dorsal XIII, 11; anal II, 11; scales in lateral line 27; between lateral line and insertion of dorsal 3; between lateral line and insertion of anal 9.

Eye large, somewhat oblong; interorbital space convex; its width equal to vertical diameter of eye. Snout short, rounded. Jaws subequal; cleft of mouth oblique; maxillary extending posteriorly to edge

of orbit; its length equal to width of interorbital space. Teeth in a single row; firmly embedded; 42 in upper jaw, 34 in the lower; incisor-like; broad anteriorly, the cutting edge scarcely rounded; narrower and gradually becoming pointed posteriorly. Gill rakers on first arch 21; long, slender, with minute bristles on the sides. Preorbital narrow, its edge not notched. Edge of suborbital serrated; not adnate to cheek. Posterior edge of preopercle finely serrated; the lower edge entire. Opercle with a rather large flat spine, above which are two closely opposed smaller ones. Scales ctenoid. Head with scales everywhere except on preorbital, symphysis of lower jaw and branchiostegal region. Body completely scaled. Dorsal and anal fins with a low sheath of scales along their bases. Interradial membranes of dorsal, anal, caudal, and pectoral fins with thin, oblong scales. Lateral line interrupted in the region of the seventeenth vertical row of scales, beginning again on the third row below, where it is represented by a single pit in each scale. Dorsal spines growing longer consecutively to the fourth; others of about equal length; middle rays of dorsal filamentous. First anal spine about one-half as long as the second; the latter a little shorter than the rays; posterior rays filamentous. Caudal deeply forked; the longest upper and lower rays filamentous. Pectoral pointed, the upper rays longest. First (outer) ray of ventral filamentous. Color violaceous; no distinct color marks on alcoholic specimens, except a faint dark spot immediately above gill opening; a small light brown spot at upper edge of base of pectoral; edges of unpaired fins narrowly washed with brownish; a narrow, indistinct, light band along the center of each lateral row of scales.

This species is known to us from the types of *Pomacentrus ruthbuni* from near Yokohama. Renewed comparison with Bleeker's plates and a larger experience with the variation of these fishes have convinced us of the identity of the Japanese specimens with Bleeker's *Pomacentrus violascens*. Bleeker's *cyanomos* and *taeniurus* are certainly closely related. The species belongs to the typical group of *Pomacentrus*, characterized by the short soft dorsal and deeply forked caudal.

(*violascens*, becoming violet.)

5. POMACENTRUS CŒLESTIS Jordan and Starks.

Pomacentrus cœlestis Jordan and Starks, Proc. Cal. Ac. Sci., 1900, p. 383, pl. xxi; Wakanoura.

Head 3.5 in body; depth 2.8; eye 3.1 in head; maxillary 3.2; interorbital 4, equal to snout. Dorsal XIII, 14; anal II, 14; scales $2\frac{1}{2}$–25–9.

Body regularly ovate-oblong, the anteriod dorsal profile more convex than ventral. Interorbital space convex. Tip of snout on a level with lower margin of eye. Mouth small, slightly oblique, the jaws

about equal; maxillary reaching to below anterior edge of pupil; teeth in a single row in jaws, conical, rather blunt. Preorbital entire. Preopercle sharply denticulated.

Dorsal without a notch between the spinous and rayed portions. The rays and spines are evenly graduated from the first spine to the eighth or ninth soft ray. The last spine is about twice the length of the first, while the ninth ray is about three times. The rays thence rapidly shorten, leaving the longest rays projecting beyond the tip of the last ray a distance nearly equal to the latter's length, and reaching past base of caudal rays. Anal similar to dorsal and about of the same height; its base and tips of longest rays ending slightly anterior to those of dorsal. Pectoral shorter than head by about half the eye's diameter; its tip reaching to within a scale and a half above origin of anal. The first ray of ventral filamentous, its tip just reaching to anal. Lobes of caudal pointed, the upper lobe the longer.

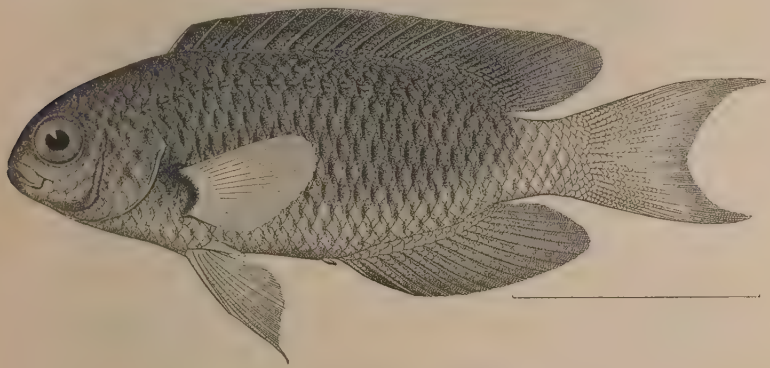

FIG. 1.—POMACENTRUS CŒLESTIS.

Snout, lower jaw, interorbital ring, and the edge of preopercle naked. Cheeks with two rows of scales. Scales on top of head extending forward to above anterior edge of pupil. A row of scales between each ray and spine of anal, dorsal, and caudal. Lateral line on sixteen scales, stopping under base of last dorsal spine.

Color in alcohol: back above lower edge of pectoral cobalt blue with a vertical dark line at the base of each scale, which extending under the transparent edge of each preceding scale shows through it, the color below fading into a purplish brown with a faint blue spot on each scale; dorsal and anal blackish, darker anteriorly; ventrals light, the outer edges dusky; pectorals and caudal yellowish, a black band across base of pectoral rays; edges of caudal and tips of rays dusky.

The single fine specimen on which this species is based was obtained by the writers at Wakanoura. The species is nearest *Pomacentrus melanochir* of Bleeker, having similar general form and coloration,

and the same absence of scales on the suborbital, mandible and snout. Bleeker's species (from Bali, Flores, Tinior, Buro, and Amboina) has three rows of scales on the cheek, and 28 instead of 25 scales in a lateral series. The coloration (dusky violet with rows of pearly spots) is somewhat different, but in both the dark curved bar at base of pectoral is conspicuous.

(*cœlestis*, sky blue.)

6. POMACENTRUS TRIPUNCTATUS Cuvier and Valenciennes.

Pomacentrus tripunctatus Cuvier and Valenciennes, Hist. Nat. Poiss., V, 1830, p. 421; Vanicolo.

Pomacentrus vanicolensis Cuvier and Valenciennes, Hist. Nat. Poiss., V, p. 421; Vanicolo.

Pomacentrus emarginatus Cuvier and Valenciennes, Hist. Nat. Poiss., V, p. 422; Waigiou.

Pomacentrus chrysurus Cuvier and Valenciennes, Hist. Nat. Poiss., V, p. 423; South Seas.

Pomacentrus trilineatus (Ehrenberg) Cuvier and Valenciennes, Hist. Nat. Poiss., V, p. 428; Red Sea.—Günther, Cat. Fish., IV, 1862, p. 25; Massua, Molucca.—Bleeker, Atl. Ichth., p. 406, pls. I to VI; Holl. Maats. Vet., 1877, p. 61; Sumatra, Java, Philippines, etc.—Day, Fishes of India, I, 1886, p. 382.—Jordan and Snyder, Proc. U. S. Nat. Mus., 1901, p. 753; Shimoda, type of *P. dorsalis*.

Pomacentrus biocellatus Rüppell, Neue Wirbelthiere Fische, 1837, p. 127, pl. XXXI, fig. 3; Red Sea.

Pomacentrus marginatus Schlegel and Müller, Amphiprion, p. 20.

Pristotis fuscus Bleeker, Bali, p. 9, 1856; Bali.

Pomacentrus katunko Bleeker, Timor, III, p. 169; Timor.

Pomacentrus bankanensis Bleeker, Sumatra, p. 513; Banka.—Günther, Cat. Fish., IV, 1862, p. 26; China Sea.

Pomacentrus taeniometopon Bleeker, Amboyna, p. 283; Molucca.—Günther, Cat. Fish., IV, 1862, p. 25.

Pomacentrus simsiang Bleeker, Nat. Tyds. Ned. Ind., 1856, p. 90; Batavia.—Günther, Cat. Fish., IV, p. 22.

Pomacentrus dorsalis Gill, Proc. Ac. Nat. Sci. Phila., 1859, p. 147; Shimoda; coll. J. Morrow of Comm. Perry's Exped.—Günther, Cat. Fish., IV, 1862, p. 29; China.

Pomacentrus punctatolineatus Cartier, Verh. Phys. Med. Ges. Würzburg, p. 98.

Of the type of *Pomacentrus dorsalis*, Gill gives the following account:

D. XIII, 15; A. II, 15. The body is oblong oval, with its abdominal outline more arched than its dorsal. The head is small, and its outline from the nape to the snout is straight. The eye is large and near the profile. The suborbital has a simple strong tooth directed horizontally backward, and separated by a semielliptical sinus from the body of the bone. The suborbital beneath the eye has also one or two small vertical processes. There are about 25 scales in a longitudinal row on the side. The color is brown, with 1 or 2 obscure bluish dots on each posterior scale of the sides. The operculum and preoperculum have a few more distinct ones, and there is also a distinct black dot at the scapular angle of the operculum. A large black dot, bordered anteriorly by bluish-white, is on the posterior rays of the dorsal. There is a black dot at the upper angle of the base of the pectoral. The ventrals are purple; the caudal yellow toward the base. (Gill.) Depth in adult about half length.

According to Bleeker, this species loses with age its black dorsal spot. Others have 3 black spots, and others 3 to 5 blue lines along the forehead; scales sometimes with blue dots; caudal and tail yellowish in adult.

This species is known to us only from the type of *Pomacentrus dorsalis* from Shimoda. This specimen, examined by us, corresponds very closely to Bleeker's figures of partly grown specimens of this widely diffused species, and we are obliged to accept the synonymy as given by him. The name *tripunctatus* is, however, prior to *trilineatus*.

(*tres*, three; *punctatus*, spotted, the young having sometimes three spots, one on the opercle, one on the soft dorsal, and one on the back of the tail.)

4. CHRYSIPTERA Swainson.

Chrysiptera Swainson, Nat. Hist. Fish., II, 1839 (*azureus*) (not *Chrysoptera* Latreille, 1825, a genus of *Lepidoptera*).

Paraglyphidodon Bleeker, Holl. Maatsch. Wetens., 1877, p. 116 (*bonang*).

Glyphidodontops Bleeker, Cat. Fish., p. 128 (*cyaneus* = *azureus*).

This genus differs from *Glyphisodon* in the presence of 2 rows of teeth in each jaw, these teeth being rounded at tip and not emarginate. It is divided by Bleeker into two genera, *Paraglyphidodon*, with the snout scaly and body rather deep, and *Glyphidodontops*, with the snout naked and the form oblong. The name *Chrysiptera* may be retained, as it differs a little from *Chrysoptera*.

(χρυσός, golden; πτερόν, fin.)

a. Adult uniform violet black; dorsal rays XIII, 14; anal, II, 13 ..... *melas*, 7.

aa. Adult brown; young with one or two black ocelli on the dorsal; dorsal rays XIII, 65; anal, II, 13 ..... *bonang*, 8.

7. CHRYSIPTERA MELAS (Kuhl and Van Hasselt.)

Glyphisodon melas (Kuhl and Van Hasselt) Cuvier and Valenciennes, Hist. Poiss., V, 1830, p. 472; Java.—Schlegel and Müller, Amphiprion, p. 23, pl. v, fig. 2.—Günther, Cat. Fish., IV, 1862, p. 45.—Bleeker, Atlas Ichth. Pom., pl. cccciv, fig. 4.—Klunzinger, Fisch. Rothen Meeres, p. 526.—Bleeker, Holl. Maat. Vet., 1877, p. 124; Nias, Singapore, Java, Celebes, Solor, Ceram, Amboyna.

Glyphisodon ater (Ehrenberg) Cuvier and Valenciennes, Hist. Poiss., V, p. 473; Massuah, Red Sea.

Glyphisodon violaceus Brevoort, Exped. Japan, 1856, p. 264; Riukiu Islands (Okinawa) (uniform dusky violet.)

"D. XIII, 14; A. II, 13; scales in lateral series 28; in transverse series 3 + 10.

"The height of the body is more than one-half of the total length, the caudal fin not included; the infraorbital ring below the orbit is not much narrower than the preorbital. Teeth very narrow, scarcely compressed. Dorsal spines rather short; caudal fin subtruncated. Uniform black, shining greenish." (Günther.)

This species is placed in the list of Japanese fishes because the description of *Glyphidodon violaceus* from Riukiu apparently refers to it. But there is room for doubt as to the accuracy of this identification.

We have 3 or 4 very young specimens from Misaki, olivaceous in life, with two narrow cross-bands of bright yellow, the caudal yellow; no ocelli. They may belong to this or some related species.

Still another species with a bright yellow caudal fin occurs in the tide pools at Misaki. Having no specimen more than an inch long we can not identify this.

(*μέλας*, black.)

8. CHRYSIPTERA BONANG (Bleeker).

Glyphidodon bonang BLEEKER, Sumatra, p. 582; Sumatra.—GÜNTHER, Cat. Fish., IV, p. 45.

Paraglyphidodon bonang BLEEKER, Holl. Maats. Vet., 1877, p. 118; Sumatra, Java.

"D. XIII, 15 to 16; A. II, 13; scales in lateral series 29; in traverse series 4 + 11.

"The height of the body is contained $1\frac{4}{5}$ times in the total length, without caudal; infraorbitals scaly; caudal fin slightly emarginate, with the lobes rounded. Mature specimens uniform brown, the dorsal, anal, and ventral fins being blackish toward the margin; a black spot superiorly at the base of the pectoral fin. Immature specimens with lighter dots, and with a large dark ocellus edged with whitish on the base of the posterior portion of the soft dorsal fin." (Günther.)

A little fish from Misaki, less than an inch long, with a large ocellus on the spinous dorsal, and a smaller black spot in the axil of the soft dorsal, can be referred to no other known species. It has the dorsal rays XIII, 16, the anal II, 13, the depth half the length, and the body with two pale cross shades.

In coloration it corresponds to the "*zonatus*" form of *Chrysiptera brownriggi* (Bennett) (*Glyphidodon antjerius* Cuvier and Valenciennes), but in form of body and number of dorsal rays it differs widely from that species.

(*bonang*, the vernacular name in Sumatra.)

9. GLYPHISODON Lacépède.

Abudefduf[1] FORSKÅL, Descr. Anim., etc., 1775, p. 59 (*sordidus*) vernacular name, not intended for use in taxonomy.

Glyphisodon LACÉPÈDE, Hist. Nat Poiss., IV, 1803, p. 542 (*moucharra*).

Stegastes JENYNS, Voy. Beagle, 1842, p. 63 (*imbricatus*) (dorsal spines 12; snout scaly).

[1] The writers have hitherto adopted for this genus the earlier name, *Abudefduf*, given by Forskål. Forskål divides the Linnæan genus *Chætodon* into three subdivisions, corresponding to the modern families of Chætodontidæ, Pomacentridæ, and Acanthuridæ. To these he applies the names of *Chætodon*, *Abudefduf*, and *Acanthurus*. The paper of Forskål, printed after his death, is one of the ablest ichthyological

Euschistodus GILL, Proc. Acad. Nat. Sci. Phila., 1862, p. 145 (*declivifrons*).

Hemiglyphidodon BLEEKER, Holl. Maatsch. Wetens., 1877, p. 91 (*plagiometopon*) (lower pharyngeals quadrate).

Amblyglyphidodon BLEEKER, Holl. Maatsch. Wetens., 1877, p. 92 (*aureus*) (scales above lateral lines in 1 or 2 rows).

Glyphidodon corrected spelling.

Body deep, compressed, covered with large ctenoid scales; snout without scales; preopercle and preorbital entire, the lower limb of preopercle scaleless; 3 to 4 rows of scales between lateral line and dorsal; teeth compressed, fixed, more or less distinctly emarginate, in one series in each jaw, those below occupying most of the free edge of the jaw; jaws subequal. Dorsal usually with 13 spines, the last slightly shorter than the median ones; branchiostegals 5 or 6; pyloric

works of the last century. An inspection of the work makes it likely that considerable confusion occurred in the arrangement of his notes for publication. It is not likely that he intended to have *Abudefduf* used as a generic name. It was apparently an Arabic word placed in his notes as a stop-gap until a classic word should be chosen, as was done in the case of *Acanthurus*. If the case of *Abudefduf* stood alone, we might feel compelled to use the name as that of a modern genus. But there are a number of similar cases in Forskål's work, among which it will be difficult to draw the line. For example, he states that the very vast genus *Sciæna* will also admit of convenient subdivision, and a number of groups under Arabic names are more or less fully defined, the type species in each case being evident. Some of these, as *Naqua* and *Harid*, are plainly not available, but for others, as *Djabub* and *Abudefduf*, something of an argument can be made. In our judgment, all these group names may be rejected as of merely vernacular, not binomial, character. In almost every case the name of Forskål (1775) has priority over its modern equivalent.

The names concerned are the following:

Forskål's group name.	Page.	Type.	Equivalent.
Naqua	XVII	gibba?	Genyoroge.
Louti	44	louti	Variola.
Daba	44	areolatus	Epinephelus.
Abudjubbe	44	lunulatus	Cheilinus.
Harid	44	harid	Scarus.
Abuhamrur	44	hamrur	Priacanthus.
Hobar	44	fulviflamma	Lutianus.
Farer	44	sammara	Holocentrus.
Ghanan	44	ghanam	Scolopsis.
Djabub	44	yarbua	Therapon.
Gaterin	45	gaterina	Plectorhynchus.
Schoür	45	mahsena	Lethrinus.
Tahhmel	45	tahmel	Opisthistius.
Abudefduf	59	sordidus	Glyphisodon.

Of these names, *Naqua* is especially dubious, as Forskål was uncertain as to its application. *Louti*, *Daba*, and *Abudjubbe* may be rejected on account of the peculiar form in which they are proposed, "*Perca dentibus* Louti," "perches having the teeth of *Perca louti*," being the designation of the subgeneric group. *Harid* is equivalent to the earlier *Scarus*. *Ghanan*, *Schoür*, and *Tahhmel* have no definition except that implied in the name, being the vernacular appellation of species defined further on. *Abuhamrur*, *Hobar*, *Farer*, *Djabub*, and *Gaterin* stand on a basis similar to that of *Abudefduf*. There is no injustice done in regarding all of these as of vernacular character, and in rejecting them all, as we reject "*Les Sphéroïdes*" and "*Les Pristipomes*" of French authors, when not placed in classical form or in binomial position.

cæca 3. Lower pharyngeals triangular. Species numerous; often brightly colored; about coral reefs in the tropical seas. We exclude from this genus all species with rounded, biserial teeth.

(*γλῦφίς*, notch, of an arrow; *ὀδούς*, tooth.)

a. Axil of dorsal without black blotch or ocellus.

b. Body with 5 distinct black cross bands, the fourth under front of soft dorsal; depth $1\frac{3}{4}$ in length; dorsa. rays XIII, 13; anal II, 12; scales 26....*saxatilis*, 9.

bb. Body with 3 dark cross bands; depth about $1\frac{3}{4}$ in length; dorsal rays XIII, 13; anal II, 13; scales 27.....*curacao*, 10.

aa. Axil of soft dorsal with a large black ocellus, persistent as a black blotch on caudal peduncle at all ages; body with about 5 narrow vertical silvery bands; depth $1\frac{3}{4}$ in length; dorsal rays XIII, 16; anal II, 16; scales 28..*sordidus*, 11.

9. GLYPHISODON SAXATILIS (Linnæus).

OYABITSUCHIYA.[1]

Chætodon saxatilis Linnæus, Syst. Nat., 10th ed., 1758, p. 276 (after *Chætodon cauda bifurca, fasciis 5, albis*, Mus. Adolph. Fred., I, p. 64); India.—Forskål, Descr. Anim., 1775, p. 62; Red Sea, and of the earliest copyists; not *Glyphidodon saxatilis* of most writers, the name having been wrongly transferred to an American species, *Glyphisodon marginatus* (Bloch).

Glyphisodon saxatilis Jordan and Snyder, Fishes of Formosa MS.; Keerun, Formosa.

Chætodon rotundus Linnæus, Syst. Nat., 10th ed., I, 1758, p. 277 (after *Chætodon rotundatus cinereus fasciis 5*); India.

Labrus sexfasciatus Lacépède, Hist. Nat. Poiss., III, 1802, p. 477; pl. xix, fig. 2; Indian Ocean.

Abudefduf sexfasciatus Jordan and Snyder, Proc. U. S. Nat. Mus., 1900, p. 755; Shimoda, Misaki.

Chætodon tyrwhitti Bennett, Fishes of Ceylon, 1833–1841, pl. xxv; Ceylon.—Richardson, Ichth. China, 1846, p. 253; Canton.

Glyphisodon waigiensis Quoy and Gaimard, Voy. Uranie Poiss., 1824, p. 391; Waigion, Rauwak.—Cuvier and Valenciennes, Hist. Nat. Poiss., V, 1830, p. 457 (fourth band under middle of soft dorsal, fifth on middle of caudal peduncle; body deep).

Glyphisodon rahti Cuvier and Valenciennes, Hist. Poiss., V, 1830, p. 456; IX, p. 507; Red Sea, Java, Celebes, New Guinea. (Caudal without dark shades.)

Glyphisodon cælestinus Cuvier and Valenciennes, Hist. Nat. Poiss., V, 1830, p. 464; IX, p. 508; Ile de France, Malabar, Alictea. (Caudal with a dark band along each lobe.)—Richardson, Ichth. China, 1846, p. 253.—Gill, Proc. Ac. Nat. Sci. Phila., 1859, p. 147; Shimoda, Canton.—Günther, Cat. Fish., IV, 1862, p. 38; Hongkong, Pinang, China, Amboyna, India.—Day, Fish. India, p. 386, pl. lxxxiii, fig. 2.—Bleeker, Atlas Ichth. Pomac., p. 408, pl. ix, fig. 5.—Bleeker, Holl. Maatsch. Wet., 1877, p. 101; Sumatra, Java, Singapore, Flores, New Guinea, Luzon, etc.—Ishikawa, Prel. Cat., 1897, p. 31; Riukiu.

Glyphidodon saxatilis var. *cœlestinus* Günther, Fische. Südsee, 1876, p. 229, pl. xxvi; Tahiti, etc.

Glyphisodon quadrifasciatus Bleeker, Labr. Cten., p. 17.

Head $2\frac{9}{10}$ in length; depth $1\frac{3}{4}$; depth of the caudal peduncle $5\frac{1}{2}$; eye $2\frac{2}{3}$ in head; snout $3\frac{1}{2}$; interorbital space $2\frac{2}{3}$; D. XIII, 12; A. II, 12;

[1] Name of some person; its application not explained.

scales in lateral series 27; between lateral line and insertion of dorsal 4; between lateral line and insertion of anal 9.

Dorsal outline straight from snout to insertion of dorsal fin, considerably arched in some specimens; base of soft dorsal descending abruptly to caudal peduncle, ventral outline pretty evenly curved between snout and caudal peduncle; interorbital space broad, flat, or slightly convex. Snout blunt, shorter than diameter of eye, jaws equal, mouth almost vertical, the maxilliary not reaching anterior edge of orbit. Teeth in a single row on each jaw, compressed and rather blunt. Pseudobranchiæ prominent; gill-rakers on first arch 8 + 17, long and slender. Edges of preopercle and preorbital entire. Head and body covered with large ctenoid scales, the snout naked; small scales extending on bases of dorsal, anal, and caudal fins. Lateral line incomplete, ending below middle of soft dorsal. Fifth and sixth dorsal spines highest, contained $1\frac{5}{8}$ times in head; middle rays of soft dorsal highest, about equal to length of head. Second anal spine very strong, its length $1\frac{3}{4}$ in head; longest rays $1\frac{1}{2}$. Caudal deeply notched, the upper lobe longest, $2\frac{3}{5}$ in length of head and body. Pectorals 3 in length, rather falcate. Ventrals extending to insertion of anal, the first ray filamentous. Color, light olive, with a silvery reflection. Body with 5 distinct brownish black vertical bands, broad above, in the middle ones pointed below; the first band extends from occiput to origin of dorsal, ending below in a conspicuous dark spot at upper part of base of pectoral; the second band extends downward from bases of fourth to seventh spines and disappears before the belly is reached; the third has its origin at bases of tenth, eleventh, and twelfth spines and extends to origin of anal; the fourth extends between anterior part of soft dorsal and posterior part of anal; the fifth, not so distinct as the others, crosses the caudal peduncle. Head dusky, very dark on interorbital area. Membranes of spinous dorsal and basal part of soft dorsal dusky; the color of the dark bands extends upward on the fins; caudal dusky near the margin and at base; the other fins with a little dusky color.

Here described from a specimen 50 millimeters long from Misaki. An individual 185 millimeters long from Formosa measures as follows: Head $3\frac{1}{4}$ in length; depth 2; depth of caudal peduncle $1\frac{5}{7}$, $6\frac{1}{2}$; eye $3\frac{1}{2}$ in head; snout $3\frac{1}{2}$; interorbital space 3; D. XIII, 13; A. II, 12; scales 4–26–10.

This species, everywhere abundant throughout the Indian region, is common in the rock pools of Yogashima, Enoshima, and elsewhere about Misaki and Shimoda. Many young specimens were taken. Similar adult examples from Formosa have been examined. Among these we find none with the caudal lobes each marked with a dusky stripe as described in the form called *cælestinus*. For this reason we have hesitated to place *cælestinus* in the synonymy of *scaralis*. It is probable, as Bleeker has noted, that this species, rather than the

American one, is the original *saxatilis* of Linnæus. The American species differs from the Asiatic one in the arrangement of its bands, the fourth being before the soft dorsal instead of under it. It should stand as *Glyphisodon marginatus* (Bloch). The Hawaiian species, *Glyphisodon abdominalis* (Cuvier and Valenciennes), is nearer the American species.

(*saxatilis*, pertaining to rocks).

10. GLYPHISODON CURAÇAO (Bloch).

Chætodon curaçao BLOCH, Ichthyol., p. 106, pl. CCXII, fig. 1; Curaçao, Caribbean Sea, by error.

Glyphisodon curassao CUVIER and VALENCIENNES, Hist. Nat. Poiss., V, 1830, p. 471.

Glyphidodon smaragdinus BREVOORT, Exped. Japan, 1856, p. 264, pl. VI, fig. 3; Riukiu (Okinawa).

Glyphidodon trifasciatus BLEEKER, Labr. Cten., p. 19; Amboyna, Ceram.—BLEEKER, Atlas Ichth. Pomac., pl. CCCCX, fig. 3.—GÜNTHER, Cat. Fish., IV, 1862, p. 42; Amboyna, Ceram.—BLEEKER, Holl. Maats. Vet., p. 105; Batu, Nias, Java, Celebes, Flores, Ternata, Ceram, Amboyna.

"D. XIII, 12 or 13; A. II, 13 or 14; scales in lateral line 27; in transverse series 3+10.

"The height of the body is three-fifths of the total length (the caudal fin not included); the snout is nearly as long as the eye; the preorbital has a distinct notch above the maxillary, and its greatest width is one-half that of the orbit. Incisors short, small, trenchant. The seventh and eighth dorsal spines are longer than the twelfth, which is generally somewhat shorter than the last; the soft dorsal elevated; the caudal forked.

"Greenish-olive, with three black cross-bands, which are ill-defined and formed by black spots on the cutaneous sheaths of the transparent scales; the first from the first five or six dorsal spines to the pectoral, the second from the ninth and twelfth dorsal spines to the vent, and the third between the soft dorsal and the anal." (Günther.)

This species is placed in the list of Japanese fishes on the basis of the figure of a specimen from Riukiu, published by Brevoort, and by him named *Glyphidodon smaragdinus*. The name *curaçao* must apparently be retained in spite of its erroneous geographical implication.

(*Curaçao*, Portuguese name of an island off the coast of Venezuela.)

11. GLYPHISODON SORDIDUS (Forskål).

Chætodon sordidus FORSKÅL, Descr. Anim., 1775, p. 62; Djidda, Red Sea.

Glyphidodon sordidus RÜPPELL, Atlas Reise Africa, Fische, 1828, p. 34, pl. VIII, fig. 1; Mohila, Red Sea.—CUVIER and VALENCIENNES, Poiss., V, 1830, p. 466; Macuer Island, Red Sea.—GÜNTHER, Cat. Fish., IV, 1862, p. 41; China, Mauritius, Red Sea.—KLUNZINGER, Fische Rothen Meeres, p. 525; Red Sea.—DAY, Fishes India, p. 385, pl. LXXXIII, fig. 1.—BLEEKER, Atlas Ichth. Pomac., p. 410, pl. XI, fig. 5; Holl. Maatsch. Vet., 1877, p. 96; Sumatra, Java, Cocos, Amboyna.—GÜNTHER, Fische der Südsee, II, 1876, p. 231; Tahiti, Raiatea, Samoa, Solomon Islands.—ISHIKAWA, Prel. Cat., 1897, p. 31; Riukiu.

Glyphisodon sordidus JORDAN and SNYDER, Fishes of Formosa Ms.; Kotosho, Formosa.

Glyphisodon gigas LIÉNARD, Dix, Rapp. Hist. Nat. Maur., p. 35; Mauritius.

Glyphidodon notatus DAY, Proc. Zool. Soc. Lond., 1869, p. 521; young.

Head $2\frac{3}{4}$ in length; depth $1\frac{3}{4}$; depth of caudal peduncle 5; eye 3 in head; snout $3\frac{1}{3}$; interorbital space 3; D. XIII, 16; A. II, 16; scales in lateral series 28; between lateral line and insertion of dorsal 4; between lateral line and insertion of anal 12. Body deep, greatly compressed, the caudal peduncle short; dorsal outline elevated, the highest point at, or a little posterior to, insertion of dorsal, the ventral contour more evenly rounded than the dorsal. Interorbital area convex. Snout short, the jaws equal, the maxillary extending to a point below anterior edge of orbit. Teeth in a single row, close set, compressed, the cutting edges finely serrated, brownish at the tips. Pseudobranchiæ large; gill rakers on first arch 5 + 15, long and slender. Edges of suborbital and preopercle entire. Head and body covered with large weakly ctenoid scales, the snout naked, bases of fins with a sheath of scales, minute scales extending far out on membranes of fins. Lateral line incomplete, ending below middle of soft dorsal. Middle spines of dorsal highest, 2 in head; middle rays of dorsal and anal highest, $1\frac{4}{5}$ in head. Caudal notched, the lobes equal. Ventrals reaching a little beyond insertion of anal, the first ray filamentous. Pectorals rounded, $1\frac{1}{5}$ in head.

Color, dark brown, becoming silvery toward the ventral parts; 5 narrow vertical silvery bands crossing the body, the first extending from insertion of dorsal to axil of pectoral fin, the second passing downward from base of sixth spine, the third from base of ninth spine, the fourth from base of first ray, the fifth from middle of soft dorsal to posterior part of anal; a large dark blotch near middle of spinous dorsal, a black spot as large as pupil on upper part of base of pectoral, a conspicuous black spot as large as orbit on body below posterior part of base of soft dorsal. Each scale has a broad, dark, posterior border. In some specimens the second light band is absent, the dark parts uniting in a broad dark band, which extends upward on the spinous dorsal.

The above description is of specimens about 45 millimeters long, from Misaki.

A specimen about 200 millimeters long, from Honolulu, Hawaiian Islands, shows the following characters: head $3\frac{1}{5}$ in length; depth $1\frac{2}{3}$; depth of caudal peduncle $5\frac{1}{4}$; eye $4\frac{1}{2}$ in head; interorbital space $2\frac{1}{2}$; snout $2\frac{3}{4}$; D. XIII, 15; A. II, 15; scales 4–26–12. The maxillary does not extend to the orbit, reaching only to a point below the nostril. The denticulations on the cutting edges of the teeth can scarcely be recognized. The width of the suborbital is contained 2 times in the orbit.

This species, common throughout India and Polynesia, is known in

Japan from numerous young examples taken by us in the rock pools of Misaki and the neighboring points of Yogashima and Enoshima. These specimens agree with others from Formosa and Hawaii. The large black blotch behind the soft dorsal is always present.

(*sordidus*, mean-looking.)

Family II. LABRIDÆ.

THE WRASSE-FISHES.

Body oblong or elongate, covered with cycloid scales; lateral line well developed, continuous or interrupted, often angularly bent. Mouth moderate, terminal; premaxillaries protractile; maxillaries without supplemental bone, slipping under membranaceous edge of the preorbital; anterior teeth in the jaws usually very strong and canine-like; teeth of the jaws separate or soldered together at base, not forming a continuous plate; no teeth on vomer or palatines; lower pharyngeals completely united into one bone, without median suture, this bone T-shaped or Y-shaped, its teeth conical or tubercular. Lips thick, longitudinally plicate. Nostrils round, with 2 openings on each side. Dorsal fin continuous, the spinous portion usually long, its spines rather slender, 3 to 20 in number, anal similar to soft dorsal, with 2 to 6 spines. Ventrals thoracic I, 5, inserted below the pectorals or slightly in advance of them. Branchiostegals 5 or 6; pseudobranchiæ well developed; gills $3\frac{1}{2}$, the slit behind the last arch small or obsolete; gill membranes somewhat connected, sometimes joined to the narrow isthmus. Air bladder present; no pyloric cæca. Species chiefly of the tropical seas, living among rocks, coral reefs, or kelp. Many of them are brilliantly colored, and some are valued as food fish. Most of them feed upon mollusks, the dentition being adapted for crushing shells.

a. Dorsal spines 8 to 13 in number, anal spines 2 or 3; vertebræ less than 30 in number; species of tropical or subtropical seas.

b. Lateral line continuous, bent abruptly posteriorly, but not interrupted.

c. *Bodianinæ*. Dorsal spines 12 or 13. Cheeks and opercles more or less scaly; preopercle usually with fine serrature.

d. Dorsal rays XIII, 7; lateral teeth of jaws more or less confluent into a blunt edged bony ridge; preorbital very high; posterior canine tooth present; base of dorsal with a scaly sheath ..... *Chœrops*, 6.

dd. Dorsal rays usually XII, 10.

e. Posterior canine present; base of dorsal with a scaly sheath; soft dorsal and anal not falcate; scales in lateral line 30 to 40.

f. Lateral teeth in jaws in one series; close set or confluent, forming a serrated edge ..... *Lepidaplois*, 7.

ff. Lateral teeth in jaws of two series, the inner close set or confluent, the outer conical and canine-like ..... *Verreo*, 8.

ee. Posterior canine wanting; base of dorsal and anal without scaly sheath; dorsal and anal not falcate; scales in lateral line 45 to 50.

Semicossyphus, 9.

cc. *Thalassominæ*. Dorsal spines 8 or 9.

g. Preopercle serrate; cheeks and opercles with large scales; posterior canine present; dorsal fin with a scaly sheath; anterior dorsal spines elevated, filamentous in the males; scales large, about 20 in lateral line ..... *Duymæria*, 10.

gg. Preopercle entire.

h. Opercles with large scales; cheeks with imbricate scales; lips moderate; base of dorsal without scaly sheath..... *Pseudolabrus*, 11.

hh. Opercles scaleless, or with a few small scales only.

i. Body oblong, not cylindrical, the depth more than one-fifth the length; opercles scaleless.

j. Dorsal spines 9.

k. Anterior canines prominent, turned forward with a cutting edge; no posterior canine. Scales moderate or large (20 to 50) ..... *Anampses*, 12.

kk. Anterior canines not turned forward to form a lateral cutting edge.

l. Scales large, 25 to 30 in lateral line.

m. Scales of breast as large as those of rest of body, or even larger; posterior canine normally present; canines of upper jaw very short, close set, forming a terminal cutting edge; lower teeth similar, but longer; mouth small; dorsal spines short, pungent.... *Stethojulis*, 13.

mm. Scales on thoracic region not enlarged; anterior canines normal.

n. Lips very thick, with folds, the lower pendant like chicken's wattles; cheeks with small scales below..... *Hemigymnus*, 14.

nn. Lips not enlarged.

o. Cheeks with two rows of small scales behind eye. *Güntheria*, 15.

oo. Cheeks entirely scaleless; no sheath of scales at base of dorsal..... *Halichœres*, 16.

ll. Scales rather small, 50 to 80 in lateral line.

p. Posterior canines obsolete ..... *Coris*, 17.

pp. Posterior canines present ..... *Julis*, 18.

ii. Body elongate, subcylindrical, covered with rather small scales; opercle with a row of small scales; no posterior canine. *Cheilio*, 19.

jj. Dorsal spines 8; no scales on head; no posterior canine tooth; dorsal with a low sheath of scales; scales large.

q. Snout short, not tubiform..... *Thalassoma*, 20.

qq. Snout much produced, forming a tube, the jaws at its end..... *Gomphosus*, 21.

bb. *Nymichthyinæ*. Lateral line interrupted behind, the anterior part following the line of the back, the posterior part median on caudal peduncle.

r. Dorsal spines 11; preopercle serrate; cheeks and opercles with scales; no posterior canines ..... *Cirrhilabrus*, 22.

rr. Dorsal spines 9 (rarely 10); preopercle entire; no posterior canines.

s. Cheeks and opercles covered with large scales; forehead not trenchant; lips full. *Cheilinus*, 23.

ss. Cheeks scaleless or nearly so; opercles scaleless; anterior profile of head more or less convex.

t. First two dorsal spines detached from the others, forming a separate fin on the occiput; anterior profile trenchant, its curve parabolic; no scales on head. *Iniistius*, 24.

6. CHŒROPS Rüppell.

Chœrops Rüppell, Verz. Mus. Senckenberg Fische, 1852, p. 20 (*meleagris* = *macrodon*).

Choirodon Bleeker, Beitr. Gen. Topogr. Bat., about 1856, p. 513 (*macrodon*), name preoccupied.

Cossyphodes Bleeker, Verh. Bat. Gen. Labr., XX, about 1861, p. 10 (*macrodon*).

Hypsigenys Günther, Ann. and Mag. Nat. Hist., 1861, VIII, p. 383 (*macrodon*).

Body compressed, oblong, covered with large scales; about 30 in the lateral line; snout obtuse; cheeks high, with very small scales which are generally not imbricate; operculum scaly; preopercle slightly serrate; forehead developing a fatty hump with age. Each jaw anteriorly with four strong canine teeth, the lateral teeth being more or less confluent into an obtuse osseous ridge; posterior canine present, at least in the adult. Dorsal rays XIII, 7; anal III, 9; soft fins not elevated; caudal subtruncate. Lateral line not interrupted.

Large fishes of the western Pacific, not crossing to Hawaii or to America.

(*χοίρος*, hog; *ὤψ*, appearance.)

a. Scales about 24; body red, with blue spots on the scales and a broad oblique band of pink on the sides anteriorly ..... *azurio*, 12.

aa. Scales about 30; body with about 4 dark cross bands; a white band on back of caudal peduncle ..... *anchorago*, 13.

12. CHŒROPS AZURIO Jordan and Snyder.

KANDAI (WINTER PERCH).

Labrus japonicus Cuvier and Valenciennes, Hist. Poiss., XIII, 1837, p. 99; Japan. Coll. Langsdorff.—Schlegel, Fauna Japonica, Poiss., 1846, p. 163, pl. LXXXV; Nagasaki (not *Labrus japonicus* Houttuyn).

Cossyphus japonicus Bleeker, Verh. Bat. Gen. Japan, 1852, pp. 16 and 114; Nagasaki.

Chœrops japonicus Günther, Cat. Fish., IV, 1862, p. 96; China.—Steindachner, Fishe Japans., IV, 1887, p. 20; Tokyo, Nagasaki.—Ishikawa, Prel. Cat., 1893, p. 30; Misaki, Kagoshima, Ogosahara (Bonin Islands).—Jordan and Snyder, Check List, 1901, p. 86; Yokohama.

Chœrops azurio Jordan and Snyder, Proc. U. S. Nat. Mus., 1901, p. 747, after Schlegel, substitute for *japonicus* preoccupied.—Jordan and Snyder, Fishes of Formosa MS.; Formosa.

Head $3\frac{1}{6}$ in length; depth 3; depth of caudal peduncle 7; eye $4\frac{2}{3}$ in head; interorbital space 3; snout $2\frac{2}{5}$; D. XIII, 7; A. III, 10; scales in

lateral series 24; between lateral line and insertion of dorsal 3; between lateral line and insertion of anal 8.

Body rather elongate, compressed, the dorsal profile rising rapidly and evenly from snout to a point above posterior part of eye, where it rather abruptly bends backward and slightly upward to near middle of spinous dorsal, then downward to caudal peduncle, the greatest dorsal elevation being nearly attained at occiput; ventral contour evenly curved from chin to caudal peduncle. Snout long, the jaws equal; preorbital very broad, 1½ times diameter of eye; interorbital area broad, notably convex; eye small, located midway between tip of snout and posterior edge of opercle. Teeth in 2 series; an inner row, which in the lower jaw has the teeth anteriorly coalesced into a narrow flat-edged ridge, laterally and posteriorly they are less closely united, making the ridge strongly serrated; in the upper jaw the inner ridge is unbroken laterally except by 2 rather strong canines in posterior part of jaw; an outer series, represented in the upper jaw by 4 strong canines, the middle ones much the larger; lower jaw with 4 canines of about equal size, embedded close together, the lateral ones curving outward. Pseudobranchiæ well developed, gill rakers on first arch 6+9, short, pointed. Posterior edge of preopercle very finely serrated; opercle with a soft flap slightly wider than diameter of pupil. Scales of body large, the dorsal and anal fins with a narrow sheath along the base; large scales extending over basal half of caudal; scales on opercle and subopercle large, on cheeks very small; preopercle with a broad naked edge. Lateral line continuous, bending rather abruptly to follow contour at base of soft dorsal fin. Posterior spines of dorsal highest, 2¾ in head, the edge of the fin notched, the membrane projecting above the spines; third anal spine strongest, its length contained 3 in head, the length of the first contained about twice in the third; rays of dorsal and anal of equal height, the longest or posterior ones 2½ in head. Caudal truncate or slightly convex, its length 1¼ in head. Upper rays of pectoral longest, the others gradually shorter; the lower posterior edge of fin rounded. Ventrals extending to the anal opening.

Color in life, head and body pinkish brown; an oblique transverse band of dull olive green extending from axil of pectoral fin to bases of eighth and ninth dorsal spines, this followed by a broad band of clear pink, bordered posteriorly by an indistinct brownish band; scales on posterior part of body each with a vertical band of light clear blue; cheeks flesh color, lips blue, iris yellow, with blue lines above and below; dorsal and anal fins golden brown, with 2 blue stripes; caudal dull olive, with blue corners above and below; pectorals pink, the base golden; ventral spines clear blue, the rays golden. In spirits the bright colors disappear, leaving a broad pinkish yellow oblique band on body, bordered by darker color. The posterior scales each have a small bluish spot.

This large and handsome fish is generally common in the bays of Japan from Tokyo southward. We have specimens from Tokyo, Misaki, Wakanoura, Kobe, Hakata, Nagasaki, and Formosa.

(*azureus*, azure blue.)

13. CHŒROPS ANCHORAGO (Bloch).

Sparus anchorago Bloch, Ichthyologia, V, p. 108, pl. cclxxvi, about 1785 (from a tank from Holland).—Schneider, Syst. Ichth., 1801, p. 276; no locality.

Cossyphus anchorago Troschel, Wiegmann's Archiv., 1840, p. 279.

Chœrops anchorago Günther, Cat. Fish., IV, 1862, p. 95; Amboyna.—Bleeker, Poissons du Japon, 1879, p. 5; Japan.

D. XIII, 7; A. III, 9; L. lat. 30. A posterior canine tooth, absent in young specimens. Preopercle serrated. Head nearly as high as long. Scales on preopercle small, numerous, imbricate. Body with 4 dark, broad cross-bands, the middle of which are sometimes confluent; a white cross-band on the back of tail, behind the dorsal; sides of the head with yellow dots; base of the pectoral brown; dorsal with two dark longitudinal lines; the other fins yellowish. (Günther.)

We have not seen this species, and record it on the identification of Dr. Ishikawa. Dr. Peters regards *Chœrops macrodonta* Lacépède as a synonym of *Ch. anchorago*, but the reason for this view is not evident.

(*anchorago*, "anchor-tooth," an old name of the hook-jawed male salmon.)

7. LEPIDAPLOIS Gill.

Lepidaplois[1] Gill Proc. Ac. Nat. Sci. Phila., 1862, p. 140 (*axillaris*).

Body compressed, oblong, covered with large scales, 30 to 35 in the lateral line. Snout pointed; mouth large, the lateral teeth in both jaws in a single series coalescent at base; four canine teeth in front and a posterior canine tooth; cheeks and opercles with imbricated scales; dorsal and anal scaly at base; lateral line not interrupted; preopercle usually finely serrated; soft dorsal and anal not falcate anteriorly; caudal fin lunate. Dorsal rays usually XII, 10. Anal rays III, 12. Tropical parts of the western Pacific from Hawaii through Polynesia to Japan and Africa.

(λεπίς, scale; ἁπλοίς, a simple cloak, in allusion to the scaly fins.)

a. Color red, orange posteriorly, a large black axillary spot, a large black spot on spinous dorsal, one on spinous dorsal and one on anal; scales 26.....*axillaris*, 15.

aa. Color red, with many yellow spots anteriorly; a yellow cross bar on side of back, posterior parts dusky; scales 27.....*perditio*, 16.

[1] The genus *Diastodon* Bowdich, Excursion to Madeira, 1825, p. 238 (*speciosus*= *scrofa* Cuvier and Valenciennes, 1837) must be different from *Lepidaplois*, having much smaller scales (about 50). The form of the dorsal is not indicated.

14. LEPIDAPLOIS AXILLARIS (Bennett).

Labrus axillaris Bennett, Proc. Comm. Zool. Soc., I, 1831, p. 166; New Hebrides.
Cossyphus axillaris Cuvier and Valenciennes, Hist. Nat. Poiss., XIII, 1837, p. 103, pl. cccLxxi; Ile de France, Ulea.—Günther, Cat. Fish., IV, 1862, p. 103; Mauritius, Madagascar, Aneitum.—Day, Fishes of India, 1885, p. 392 (with plate of *Cossyphus neilli*, apparently a different species having no dark spots).—Günther, Fische der Süd-See, II, p. 239; Red Sea, Mauritius, Madagascar, New Hebrides, Society Islands, Paumotu, Otaheite.

Head $3\frac{2}{5}$ in length; depth 3; depth of caudal peduncle $5\frac{3}{4}$; eye $4\frac{1}{2}$ in head; interorbital space $3\frac{3}{4}$; snout $2\frac{2}{3}$; D. XII, 10; A. III, 12; scales in lateral series 26; between lateral line and insertion of dorsal 4; between lateral line and insertion of anal 10.

Body elongate; caudal peduncle deep, compressed; head pointed; the snout long and sharp. Eye midway between tip of snout and border of opercle. Mouth large. Teeth in a single series, laterally coalesced at their bases, becoming entirely so anteriorly, where they are represented by flat plates; an outer series of 4 fangs on the tip of each jaw, the lateral ones of which are curved outward; 2 strong fangs projecting forward from the posterior part of each side of upper jaw. Pseudobranchiae large; gill-rakers on first arch 4+8, short, pointed. Posterior border of preopercle finely serrated. Scales extending as a basal sheath on dorsal, anal, and caudal fins; scales of cheek in 7 rows between eye and angle of preopercle; no naked space along edge of opercle; scales of head not elongate. Lateral line rather gently curved to follow contour of body below base of soft dorsal. Longest dorsal spine, $2\frac{1}{6}$ in head; longest ray, $1\frac{3}{4}$; third anal spine, $1\frac{5}{6}$; longest or first ray, $1\frac{3}{4}$. Caudal truncate, $1\frac{1}{6}$ in head; pectoral, $1\frac{2}{5}$; ventral, $1\frac{1}{2}$, not reaching anal opening.

Color, in alcohol, dull brownish olive, a large brownish black spot on base of pectoral, both before and behind, a similar spot on upper anterior part of spinous dorsal, on upper anterior part of soft dorsal, and in the same place on anal, the latter somewhat the larger; a trace of lemon yellow on soft dorsal and anal; ventrals with rows of small dark spots.

Color in life, according to Günther, brick-red on anterior third above the ventral surface, pink on the middle third, and orange posteriorly; the boundary between the red and pink oblique, between the pink and orange vertical; anterior ventral surface greenish; spinous dorsal pinkish, soft dorsal yellow, ventrals and anal greenish yellow, the former spotted with blue; the black spots as described above.

This species is known to us from a specimen 170 millimeters long, received from Nafa, Okinawa Island, in the Riukiu archipelago.

(*axillaris*, pertaining to the axil.)

15. LEPIDAPLOIS PERDITIO (Quoy and Gaimard).

Labrus perditio Quoy and Gaimard, Voy. Astrolabe, 1834, p. 702, pl. xx, fig. 4; "obtained on dangerous reefs in the Pacific."

Cossyphus perditio Cuvier and Valenciennes, Hist. Nat. Poiss., XIII, 1837, p. 125 (after Quoy and Gaimard).

Cossyphus atrolumbus Cuvier and Valenciennes, XIII, 1837, p. 123; Ile de France.—Günther, Cat. Fish., IV, 1862, p. 105; Mauritius, Minerva Reef, Saumarey Reefs, Aneitum.

Head $3\frac{1}{2}$ in length; depth $2\frac{1}{2}$; depth of caudal peduncle 6; eye $5\frac{1}{2}$ in head; interorbital space $3\frac{1}{3}$; snout $2\frac{2}{3}$; D. XII, 10; A. III, 12; scales in lateral series 27; between lateral line and insertion of dorsal 5; between lateral line and insertion of anal 13.

Body rather heavy and thick, the dorsal and ventral outlines pretty

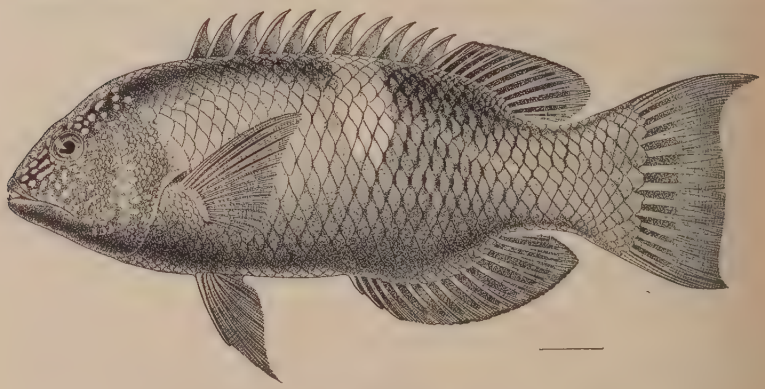

Fig. 2.—Lepidaplois perditio.

evenly rounded except above occiput, where there is a slight elevation; head bluntly pointed. Jaws equal. Teeth in 2 series on anterior part of jaws, in a single series laterally; the inner series of upper jaw coalesced into a sharp, slightly serrated ridge; in the lower jaw the teeth are coalesced at the bases, the tips being quite prominent laterally; outer series represented by 4 strong canines of equal size in upper jaw; by 4, the inner 2 of which are small and close together, in the lower jaw. Edge of preopercle smooth or slightly serrated. Gill rakers on first arch 6+11, short, pointed; pseudobranchiæ very large. Soft dorsal, anal, and caudal with a basal sheath of scales; interorbital space, snout and lower jaw naked, 9 series of scales on cheek, a narrow naked space along edge of preopercle. Membrane of dorsal incised almost to bases of spines, the membrane covering each spine thickened and projecting some distance beyond tip of spine; anterior spines longest, $4\frac{2}{5}$ in head, longest rays, $2\frac{1}{3}$, third anal spine 3. Caudal truncate, the uppermost and lowermost rays forming a falcate projection, the upper rays $1\frac{1}{5}$ in head. Ventral rays almost reaching first anal spine. Pectorals $1\frac{1}{4}$ in head.

In spirits the head is covered with small light spots; there is an elongate yellowish blotch on body above tip of pectoral, the scales on posterior half of body are edged with brownish black, the membrane of spinous dorsal is black anteriorly, the anal fin has a dark band near its border.

Here described from a specimen 330 millimeters long from Wakanoura.

Color in life, bright copper red, occasionally greenish red, brighter in front, becoming suffused with dark orange, then with violet on the posterior parts; head freckled with yellow spots, iris red, chin and breast bright yellow, a yellowish white vertical band, bordered posteriorly by black, on body above tip of pectoral; spinous dorsal bluish black, soft dorsal golden, scarlet at base; anal golden, red at base, tipped with blackish; caudal bright yellow; pectoral pinkish with dark shades along the rays; ventral similar, though darker.

This species is known to us from four large examples beautifully colored, obtained by us from live boxes at Seikasaki, near Wakanoura, in Kii.

The species is doubtless identical with the one poorly described under the names of *perditio* and *atrolumbus*. The yellow cross-bar and the yellow spots on the head are very characteristic.

(*perditio*, loss; the fish was described and painted by Quoy during a storm and in imminent danger of shipwreck.)

8. VERREO Jordan and Snyder, new genus.

Verreo JORDAN and SNYDER, new genus (*oxycephalus*).

This genus differs from *Lepidaplois* in having the teeth in 2 series, the outer ones canine-like, growing smaller posteriorly, the inner ones coalesced into a narrow, blunt-edged plate; a large straight posterior canine projecting forward from hinder part of upper jaw. Large fishes, similar in appearance to *Lepidaplois*.

(*verres*, a young boar.)

16. VERREO OXYCEPHALUS (Bleeker).

KITSUNEDAI (FOX PERCH).

Cossyphus oxycephalus BLEEKER, Ichth. Notices, 1862, p. 7. (Specimen in Museum of Leyden, supposed to be from Japan.)—GÜNTHER, Cat. Fish., IV, 1862, p. 109; Australia.

? *Cossyphus unimaculatus* MACLEAY, Fishes of Australia, 1881, p. 77; Port Jackson.

Cossyphus unimaculatus STEINDACHNER and DÖDERLEIN, Fische Japans, IV, 1887, p. 15; Tokyo. ISHIKAWA, Prel. Cat., 1893, p. 30; Tokyo, perhaps not of Günther.

Diastodon unimaculatus JORDAN and SNYDER, Check List, 1901, p. 87; Yokohama.

Head $2\frac{4}{5}$ in length; depth $2\frac{4}{5}$; depth of caudal peduncle $7\frac{1}{2}$; eye $5\frac{1}{2}$ in head; interorbital space $4\frac{1}{4}$; snout $2\frac{3}{5}$; D. XII, 11; A. III, 12; scales in lateral series 34; between lateral line and insertion of dorsal 5; between lateral line and insertion of anal 12.

Snout long and sharp, preorbital broad, interorbital space slightly convex; eye large, midway between tip of snout and posterior edge of opercle. Outer series of teeth canine-like, larger anteriorly; a strong canine projecting forward from back part of upper jaw; inner series of teeth coalesced into a narrow blunt-edged plate. Pseudobranchiæ large; gill rakers on first arch 4+8, short, pointed. Preopercle finely serrated posteriorly. Dorsal with a sheath of scales posteriorly, anal and caudal with narrow sheaths; scales of head imbricate, those on occiput, cheeks, and on subopercle small, the latter elongate, those of opercle large; scales on cheek in about 7 series, counting downward from eye; snout, interorbital space, chin, and a space along edge of preopercle naked. Lateral line complete, evenly curved to caudal peduncle. Membrane of spinous dorsal deeply incised, the last spine longest, $2\frac{4}{5}$ in head, the seventh ray longest, $2\frac{1}{5}$ in head. Anal spines strong, the second heaviest, the third longest, $2\frac{2}{3}$ in head. Caudal

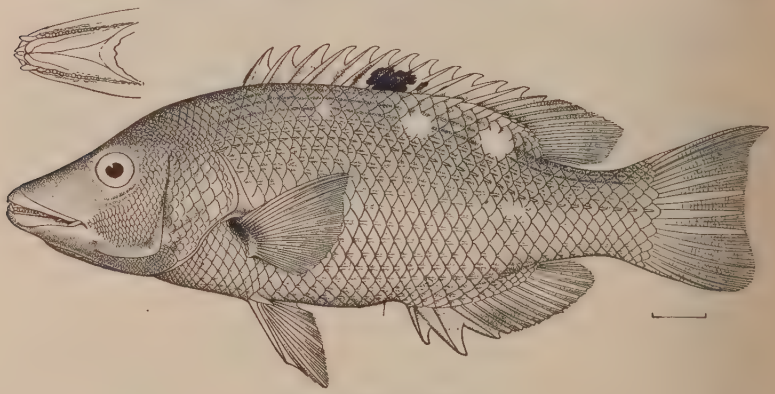

FIG. 3.—VERREO OXYCEPHALUS.

concave, the upper rays slightly longer than the lower, $1\frac{1}{3}$ in head. Ventrals not quite reaching anal opening. Pectorals $1\frac{3}{4}$ in head.

Color said to be red in life; a large black spot on dorsal in region of seventh, eighth, and ninth spines; posterior part of pectoral black, the dark color passing over to the upper side and extending downward along the base of the fin; each side with 3 or 4 white spots, perhaps pinkish in life; a small one under the fifth dorsal spine; a larger one under last dorsal spines; another large one under front of soft dorsal, and a smaller one below and behind it, below the lateral line.

This species is known in Japan from four specimens obtained in the markets of Tokyo, one by Dr. Döderlein, and the others by Professor Otaki. From specimens sent by Otaki to the Museum of Stanford University our description and figure are taken.

It is close to the *Verreo unimaculatus* Günther, the common "Pigfish" of Australia, but it may differ in the presence of white spots

and possibly in the larger scales. If the two species are identical, as Günther has supposed, the name proposed by Bleeker, in an article quoted by Günther in the appendix to his own volume, is probably the earlier. At any rate, its type is Japanese.

(ὀζύς, sharp; κεφαλή, head.)

9. SEMICOSSYPHUS Günther.

Semicossyphus Günther, Ann. and Mag. Nat. Hist., VIII, 1861, p. 384 (*reticulatus*).

Body compressed, oblong, with rather small scales; about 50 in the lateral line; head longer than high. Scales on the cheeks and opercles; base of the vertical fins and limbs of the preoperculum not scaly; preopercle serrulate; lateral line not interrupted; 4 canine teeth in each jaw anteriorly; no posterior canine tooth; an obtuse osseous ridge round the edges of the jaw, without distinct lateral teeth. Adult specimens with a large hump of fat on the forehead. Dorsal rays XII, 10; Anal rays III, 12. Soft caudal, slightly concave. Species of large size found only along the coasts of Japan. From the Californian genus, *Pimelometopon*, *Semicossyphus* differs in the absence of the posterior canine tooth.

(*semi* = half; *Cossyphus*, a related genus, a synonym of *Bodianus* or *Harpe*.)

17. SEMICOSSYPHUS RETICULATUS[1] (Cuvier and Valenciennes).

KOBUDAI.

Cossyphus reticulatus Cuvier and Valenciennes, Hist. Poiss., XIII, 1839, p. 139; Japan, Coll. Langsdorff.—Richardson, Ichth. Chin., 1846, p. 255; Canton.—Bleeker, Act. Soc. Sc. Indo-Nederl., VI, Japan, VI, p. 72; Nagasaki.

Labrus reticulatus Schlegel, Fauna Japonica, Poissons, 1846, p. 161, pls. lxxxiii, lxxxiiia, lxxxiv; Nagasaki.

Semicossyphus reticulatus Günther, Cat. Fish., IV, 1864, p. 99, after Schlegel.—Steindachner and Döderlein, Fische Japana, IV, 1887, p. 14; Tokyo.—Ishikawa, Prel. Cat., 1893, p. 30; Tokyo.—Jordan and Snyder, Check List, p. 87; Tokyo.

Semicossyphus robecchii Steindachner and Döderlein, Fische Japana, IV, 1887, p. 15; Yokohama, young.—Jordan and Snyder, Check List, 1901, p. 87; Yokohama.

Head 3 in length; depth 3; depth of caudal peduncle 6½; eye 7 in head; interorbital space 3; snout 2½; scales in lateral series 37; in series between lateral line and insertion of dorsal 7; between lateral line and insertion of anal 16. Dorsal rays XII, 10; Anal rays III, 12.

[1] *Labrus microlepidotus* Bloch, Ichthyologia, pl. ccxcii, 1785, from unknown locality = *Cossyphus microlepidotus* Cuvier and Valenciennes, XIII, p. 140, may be identical with *Semicossyphus reticulatus*, but seems rather more likely a true *Labrus*, as *Labrus mixtus*, having the dorsal rays XVII, 13, the anal III, 10, the fins small, and the coloration nearly uniform.

Body thick-set, elongate, the caudal peduncle deep; head with a hump, small on younger specimens, increasing greatly with age, on the anterior part of interorbital space. Snout sharp, jaws equal. Teeth in two series, those of the inner jaw coalesced to form a narrow sharp-edged ridge in each jaw, the ridge smooth in the upper jaw, strongly serrated in the lower; the outer row represented by 4 strong, fang-like teeth above and below, the inner ones of the upper jaw larger than the outer, the reverse being the case in the lower jaw. Pseudobranchiæ large; gill-rakers short, blunt, 6 + 10 on first arch. Posterior edge of preopercle very finely serrated. Scales not extending on bases of dorsal and anal fins; scales of head very small, 6 or 7 rows on cheek, the interorbital area, snout, chin, and a narrow space along edge of preopercle naked. Lateral line complete, evenly curved, there being no abrupt bend below base of soft dorsal. Dorsal spines low, the longest 3 in head, the membranes deeply incised, the thickened portion around each spine extending a short distance above point of spine; seventh ray

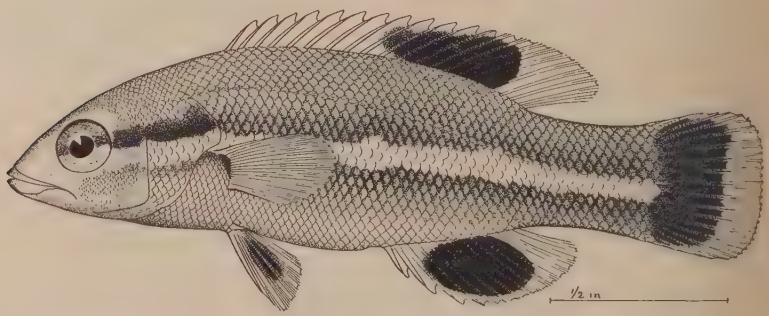

FIG. 4.—SEMICOSSYPHUS RETICULATUS (very young).

longest, about 2 in head. Second anal spine $5\frac{1}{2}$ in head, longest anal ray $2\frac{1}{4}$. Pectoral $1\frac{2}{3}$ in head; ventral $1\frac{3}{4}$, reaching but little over half way from its base to the vent.

In spirits the scales each have a dusky vertical band near the base which shows through the overlying scale; soft dorsal, anal and caudal mostly black; ventrals and axil of pectoral dusky; a narrow light band extends along the side of body. In life, crimson reddish, the young with a whitish or pink lateral stripe, the dark spots as above described.

The above description is of a specimen 250 millimeters long from Wakanoura.

With increasing age the black spots of the fins almost entirely disappear, the hump on the interorbital region assumes large proportions, in one specimen being about 300 millimeters above the skull, the lateral teeth of each jaw become more distinct and prominent, the serrations of the preopercle disappear, while the narrow pink lateral stripe

vanishes entirely. A specimen about 500 millimeters long from Tokyo shows the following characters: Head $3\frac{1}{8}$ in length; depth $2\frac{9}{10}$; depth of caudal peduncle $6\frac{2}{3}$; eye $7\frac{1}{2}$ in head; snout $2\frac{1}{3}$; interorbital space $2\frac{1}{2}$.

This species, which reaches a large size, is occasionally taken in the bays of southern Japan. We found it occasionally in the markets of Tokyo, and also at Misaki, Wakanoura, Onomichi, and Hakata. Specimens corresponding to the description of *Semicossyphus robecchii* were obtained at Tokyo and Onomichi. These have the soft dorsal and anal chiefly black, and a conspicuous whitish or rather pink stripe along the side. These are apparently the young of *S. reticulatus*, which becomes plain dull crimson with age. Still younger specimens have the pale lateral stripe and black fin spots still more distinct. We figure one of these from Wakanoura.

(*reticulatus*, netted.)

10. DUYMÆRIA Bleeker.

Duymæria Bleeker, Act. Soc. Sci. Indo-Nederl., I, 1856, Amboyna, p. 52 (*aurigaria*).

Labrastrum Guichenot, Rev. Zool., 1860, p. 152, (*flagellifera*).

Body oblong, rather deep, compressed, covered with very large scales, 20 to 25 in the lateral line; lateral line continuous; cheeks and opercles with large imbricated scales; preopercle serrated. Teeth uniserial on sides of jaw; 4 strong canines in each jaw; posterior canines present; dorsal fin with a narrow scaly sheath; anterior dorsal spines rather high; sometimes filamentous; soft dorsal not falcate; caudal rounded. Dorsal rays, IX, 11. Anal rays, III, 9. Species of rather small size, brightly colored, the sexes unlike, East Indies, north to Japan.

(Named for A. J. Duymær van Twist, once governor of the Dutch East Indies.)

18. DUYMÆRIA FLAGELLIFERA (Cuvier and Valenciennes).

OHAGUROBERA (TOOTH-BLACK BERA)[1]; GONBEKUSABI (RUSTIC WEDGE-FISH); MOROKO SHIBERA (CHINESE BERA).

Cheilodactylus flagellifer Cuvier and Valenciennes, Hist. Nat. Poiss., XIII, 1837, p. 240; no locality (male).—Schlegel, Fauna Japonica Poiss., p. 166, pl. ccccvi, fig. 2, 1846; Nagasaki.

Duymæria flagellifera Bleeker, Act. Soc. Sci. Indo. Nederl., Amboyna, I, 1856, p. 53.—Günther, Cat. Fish., IV, 1862, p. 121 (after Schlegel).—Ishikawa, Prel. Cat., 1897, p. 29; Boshu, Tokyo.—Jordan and Schneider, Fishes of Formosa, Ms.; Formosa.

Cheilodactylus aurigarius Richardson, Voyage of the Sulphur, Fishes, 1844, p. 90, pl. xlv, figs. 1, 2; Canton, male.

[1] The name *Bera* is applied by the Japanese to all Labroid fishes. Ohaguro, is the black ink-like dye used by peasant women in staining their teeth.

Duymæria aurigaria BLEEKER, Act. Soc. Sci. Indo. Nederl., I, Amboyna, 1865, p. 53.—GÜNTHER, Cat. Fish., IV, 1862, p. 121; Canton.—KAROLI, Prodr. Pisc. Asia, Orient, 1882, p. 28; Canton, Nagasaki.

Crenilabrus rubellio RICHARDSON, Voyage of the Sulphur, Fishes, 1844, p. 93, pl. XLV, fig. 3; Canton, younger male.

?? *Duymæria amboinensis* BLEEKER, Act. Soc. Sci. Indo. Nederl., I, 1856, Amboyna, p. 53; Amboyna (female); Atlas Ichth., p. 78, pl. XXIII, fig. 7; Amboyna.

Crenilabrus spilogaster BLEEKER, Japan, p. 416; Verh. Bat. Gens., XXVI, Nalez, Japan, 1852, p. 113, pl. VIII, fig. 2; Nagasaki, female.

Duymæria spilogaster BLEEKER, Act. Soc. Sci. Indo. Ned., Amboyna, I, 1856, p. 54.—GÜNTHER, Cat. Fish., IV, 1862, p. 122, after Bleeker.—KAROLI, Prodr. Pisc. Asia, Orient, 1882, p. 28; Yokohama.—ISHIKAWA, Prel. Cat., 1897, p. 29; Boshu, Sagami.

Duymæria japonica BLEEKER, Act. Soc. Sci. Indo. Ned., Amboyna, I, 1856, p. 53; Nagasaki, after Schlegel (male).—STEINDACHNER and DÖDERLEIN, Fische Japans, IV, 1887, p. 17; Tokyo.—JORDAN and SNYDER, Check List, 1801, p. 87; Yokohama.

Head $3\frac{1}{5}$ in length; depth $2\frac{1}{2}$; depth of caudal peduncle $6\frac{2}{3}$; eye $5\frac{1}{2}$ in head; snout $2\frac{1}{2}$; interorbital space $3\frac{1}{2}$. Dorsal rays IX, 11; Anal rays III, 9; scales in lateral series 22; between lateral line and insertion of dorsal 2; between lateral line and insertion of anal 6; scales on cheek in 2 rows.

Body rather short, compressed, elevated; a slight depression in contour above eye; head large, snout bluntly pointed, the jaws equal; interorbital area decidedly convex. Teeth in a single series laterally, a double series on anterior part of jaws; inner series with the teeth coalesced at base, the tips separate on sides of jaws; a canine in posterior part of upper jaw; outer series of 4 widely separated canines in each jaw, those above widely separated; below, closely apposed. Pseudobranchiæ large; gill-rakers on first arch very short and stumpy. Preopercle finely serrated posteriorly, a small flap on the angle. Scales large; between lateral line and insertion of dorsal there is one large scale and a much smaller, triangular one; interorbital space, snout, chin, and a narrow area along edge of preopercle naked. Lateral line abruptly bent downward below base of dorsal fin; in some specimens rather evenly curved, or occasionally incomplete, and one or two scales below the soft dorsal without pores. Membrane of spinous dorsal not deeply incised between the spines, the thickened portion around each spine extending upward beyond the tip, forming in the male a long filament on the first and second spines, its height equal to length of head; the longest rays $1\frac{3}{4}$ in head. Second spine 4 in head, longest ray $1\frac{1}{2}$. Caudal rounded, $1\frac{1}{16}$ in head. Pectorals rounded, $1\frac{5}{6}$ in head. Ventrals extending to vent.

Described from a male specimen about 200 millimeters long, collected in Tokyo.

Color of male in alcohol, brownish, scales edged with light color; cheeks and opercles with narrow light-colored reticulations; dorsal

blackish with small spots and reticulations of greenish white; anal and caudal blackish; pectoral light. Female of a yellowish or brownish tint with a tinge of greenish, the scales with a light border, each scale of breast and belly with a small indigo-colored spot, a dash of the same color on the posterior part of opercle; dorsal, anal, and caudal greenish, mottled with dusky; ventrals tipped with dusky; anterior dorsal spines little produced, much lower than in the male.

This species is common throughout southern Japan in sandy bays, and is frequently seen in the markets. The male is very brightly colored in life, deep blue with markings of old gold, while the female has the dorsal fin lower, is paler, and is marked with indigo-blue spots. Ample dissections have shown that the nominal species *spilogaster* is the female of *flagellifera*, six male and four female specimens having been examined. Our specimens are from Tokyo, Misaki, Wakanoura, Kobe, Nagasaki, and Formosa.

(*flagellum*, whip; *fero*, to bear, from the produced dorsal spines of the male.)

11. PSEUDOLABRUS Bleeker.

Pseudolabrus Bleeker, Proc. Zool. Soc. London, 1861, p. 413 (*rubigimosus=japonicus*).

Body compressed, oblong, covered with large scales, 25 to 30 in the lateral line; snout pointed; forehead without fatty hump; opercles scaly; cheeks with several rows of scales; dorsal fin not scaly at base; lateral line not interrupted; preopercle entire. Teeth in one series in the jaws; posterior canine present; lower pharyngeal teeth in more than one series. Fins low, the caudal subtruncate; fin rays D. IX, 10; A. III, 10. Size rather small.

Western Pacific, the species rather numerous.

The genus is not related to *Labrichthys* (*cyanotænia*) with which genus it has been associated.

(ψεῦδος, false; *Labrus*.)

a. Scales on cheek in four rows; depth in adult about $2\frac{2}{3}$ in length; body reddish with several narrow olive-green stripes, most conspicuous on the head; male and sometimes female, also with two rows of pink spots below the dorsal; dorsal fin with black spots or blotches ..... *japonicus*, 19.

aa. Scales on cheek in three rows; body slender; depth in adult 4 in length; color olivaceous, reddish below; a small dark spot on caudal peduncle, no olive stripe nor pink spots ..... *gracilis*, 20.

19. PSEUDOLABRUS JAPONICUS (Houttuyn).

SASANOHA (BAMBOO LEAF); BERA.

Labrus japonicus Houttuyn, Beschryvning Einige Japansche Vissehen, 1782, p. 311 *et seq.*; Nagasaki (female), description incomplete.

Labrus rubigimosus Schlegel, Fauna Japonica, Poiss., 1846, p. 165, pl. LXXXVI, fig. 1; Nagasaki, male; not *Julis rubigimosus* Richardson, 1843, also apparently a *Pseudolabrus*.

Labrichthys rubiginosa GÜNTHER, Cat. Fish., IV, 1862, p. 114; China, Japan.—STEINDACHNER and DÖDERLEIN, Fische Japans., IV, 1887, p. 16; Tokyo, Nagasaki.—ISHIKAWA, Prel. Cat., 1893, p. 30; Tokyo.

Labrus eothinus RICHARDSON, Ichthyol. China, 1846, p. 255; Canton, male.

Pseudolabrus eothinus JORDAN and SNYDER, Proc. U. S. Nat. Mus., 1900, p. 359, Tokyo.—JORDAN and SNYDER, Proc. U. S. Nat. Mus., 1900, p. 756; Tsushima.—JORDAN and SNYDER, Check List, 1901, p. 87, Yokohama.

Labrichthys affinis DÖDERLEIN, MS.—STEINDACHNER, Fische Japans., IV, 1887, p. 16; Tokyo, female.

Head $3\frac{1}{3}$ in length; depth $2\frac{2}{3}$; depth of caudal peduncle $6\frac{1}{3}$; eye $5\frac{1}{2}$ in head; interorbital space 4; snout $2\frac{2}{5}$; D. IX, 10; A. III, 10; scales in lateral series 23; between lateral line and insertion of dorsal 3, the upper scale very small; between lateral line and insertion of anal 8; scales on cheek in 5 rows.

Body rather elongate, compressed; dorsal contour not elevated, evenly rounded. Head pointed, snout rather pointed, the jaws equal. Teeth in a single series on sides of jaws, distinct though close set; in 2 series anteriorly, the inner ones minute, the outer ones fang-like, curving backward; 1 or 2 fangs in posterior part of upper jaw. Pseudobranchiæ not very large; gill-rakers on first arch 7+8, short, pointed. Posterior edge of preopercle smooth, the membrane projecting beyond the edge. Scales not extending far out on dorsal and anal fins, a very narrow sheath present; basal half of caudal with scales; interorbital space, snout, chin, and a narrow space along edge of preopercle naked. Lateral line complete, bending abruptly downward below base of soft dorsal. Edge of membrane of spinous dorsal notched, the membrane but little thickened around the spines; longest spine $4\frac{2}{3}$ in head, ray $2\frac{2}{3}$. Second anal spine $4\frac{3}{4}$ in head, the longest ray $2\frac{1}{2}$. Caudal truncate or slightly rounded, its length $1\frac{3}{5}$ in head. Ventrals and pectorals reaching an equal distance posteriorly, their tips as far before the vent as the insertion of the anal is behind it.

Color in spirits: Male, yellowish olive, 5 conspicuous, blackish, narrow, longitudinal stripes on upper part of body, the first just below base of dorsal, the second, third, and fourth radiating from eye, the fifth joined to the fourth just above pectoral; in very brightly colored specimens the third and fourth stripes are continued on the snout; between the stripes are small yellowish white spots, sharply defined from the first to the third stripes, indistinct or absent between the lower ones, the spots alternating with each other; a dark spot at upper edge of base of pectoral; snout and occiput dusky; dorsal with a black blotch somewhat larger than eye on the spinous part, sometimes followed by a second, less distinct spot, the membranes with dusky spots and reticulations; anal with 2 longitudinal dusky bands; caudal dusky; pectorals and ventrals plain. Female with narrow dark stripes on upper part of head, the lowest on a level with eye, a number of very indistinct orange-colored lateral stripes on body, 2 rows of small yellowish white alternating spots below base of dorsal, 2 short rows of

similar spots along sides of belly, a small spot at upper edge of base of pectoral; dorsal with 2 rows of sharply defined, very small black spots; other fins plain.

Color of male in life: Body and head greenish blue, cheeks and throat with reddish orange reticulations, lines of same color through eye; top of head and nape brownish; scales of upper parts with yellowish centers, the posterior ones tinged with red, broadly edged with greenish blue; upper part of body with 4 or 5 indefinite lateral stripes; dorsal greenish with reticulations of bright yellowish red; pectorals yellowish red, brightest on upper part of fin; anal greenish blue, with 3 wavy longitudinal lines of brick red; caudal edged with light orange.

This species is one of the commonest in the bays of southern Japan, abounding in all rocky places in shallow water, and frequently taken on the hook in the surf. It varies much in color from brilliant red to dull olive. The male has black blotches on the dorsal and about 5 streaks of dark olive on the body. The female has the dorsal with black dots, not blotches, and the streaks on the body are more or less obsolete. The pale spots along the sides of the back are almost always conspicuous in the male, but are often faint or absent in the female.

Our specimens are from Tokyo, Misaki, Enoshima, Wakanoura, Kobe, Hiroshima, Tsuruga, Hakota, Nagasaki, Tsushima and Totomi Bay where it was dredged in rather deep water.

20. PSEUDOLABRUS GRACILIS (Steindachner).

Labrichthys gracilis Steindachner, Fische Japans, IV, 1887, p. 17; Tokio.
Pseudolabrus gracilis Jordan and Snyder, Check List, 1901, p. 87.

Head 4 in length; depth 4; depth of caudal peduncle 2⅔; eye 5 in head; interorbital space 4¾; snout 3; D. IX, 11; A. III, 10; scales in lateral series 23; between lateral line and insertion of dorsal 1; between lateral line and insertion of anal 7; rows on cheek 3.

Body notably elongate; snout sharp; jaws equal; interorbital area low, convex; eye somewhat nearer to tip of snout than to posterior edge of opercle. Teeth in a single series laterally, coalesced or closely apposed at base, the points distinct; 1 or 2 strong canines projecting forward from posterior part of upper jaw; an outer row represented on anterior part of jaws by 2 canines above and 4 below. Posterior edge of preopercle not serrate, opercle with an elongate flap. Gill-rakers on first arch 7+10, short, pointed. Scales not forming a sheath on bases of dorsal and anal; basal half of caudal with scales; those on opercle large, imbricated. Lateral line complete, high on body, bent abruptly downward below base of soft dorsal. Dorsal low, the membrane scarcely incised, not thickened around the spines, a short, soft filament projecting beyond each spine, longest spine 3 in head, ray 2⅘. Second anal spine 5⅓ in head, longest ray 2⅔. Caudal rounded, 1¼ in head, pectoral 1⅔; ventral 1⅔, the outer ray of the latter filamentous.

Color in spirits yellowish white, dusky above, the dusky color abruptly ceasing along the middle of the third row of scales below the dorsal fin; a dusky band bordered by blackish extending from tip of snout through eye and on head; it can be indistinctly traced to the upper part of caudal peduncle, where it ends in a small dark blotch.

Described from a specimen 140 mm. long from Nagasaki.

This well-marked species is distinguished by its slender body and by the presence of but 3 rows of scales on the cheek. It seems to be rare. We have but 2 specimens from Nagasaki and Misaki.

(*gracilis*, slender.)

12. ANAMPSES Cuvier.

Anampses Cuvier, Règne Anim., 2d ed, 1829. (*tetrodon; cuvieri*, the characters taken from the latter species; the former perhaps a *Tilapia*).

Ampheces Jordan and Snyder, new subgenus (*geographicus*).

Body oblong, rather deep, compressed, covered with moderate or large scales (25 to 30 in the lateral line, about 50 in subgenus *Ampheces*); lateral line continuous; head scaleless; preopercle entire; teeth uniserial; two anterior canines in each jaw prominent, turned forward, compressed, with cutting edges; no posterior canines; fin rays D. IX, 12; A. III, 12. Species of rather large size and showy colors, of the East Indies and Polynesia. The group is naturally divisible into two groups distinguished by the size of the scales. The Japanese species constitutes the new subgenus or probably distinct genus *Ampheces*,[1] distinguished from *Anampses* by the small scales.

(*Ἀνάμψης*, probably an old name, its meaning not explained.)

21. ANAMPSES GEOGRAPHICUS Cuvier and Valenciennes.

Anampses geographicus Cuvier and Valenciennes, Hist. Nat. Poiss., 1510, XIV, 1839, p. 10, pl. cccLxxxix; Amboyna.—Bleeker, Atlas Ichth., 1862, p. 102, pl. xxv, fig. 3; Amboyna, Ceram.—Günther, Cat. Fish., IV, 1862, p. 137; Amboyna.—Ishikawa, Prel. Cat., 1897, p. 29; Riukiu Islands.

Dorsal rays IX, 12; anal rays III, 12; scales in lateral line 50; in transverse series 8+22.

Dorsal spines stiff. Brownish violet, each scale with a blue vertical streak; head, thoracic region, and caudal fin with reticulated, blue, darker edged lines. Vertical fins with a yellow hue and black margin; dorsal and anal with numerous small blue dots (Günther).

This species is placed in the present list because a specimen from Riukiu is in the Imperial Museum of Tokyo. It is regarded by us as the type of a distinct subgenus *Ampheces*, distinguished from *Anampses* by the small scales (50 instead of 30).

(*geographicus*, from the map-like markings.)

[1] *Ἀμφήκης* (double biting).

13. STETHOJULIS Günther.

Stethojulis GÜNTHER, Cat. Fish., IV, 1862, p. 140 (*strigiventer.*)

Body oblong, compressed, covered with large scales, 25 to 30 in lateral line, those of the thorax enlarged, larger than those of the rest of the body; head scaleless; lateral line not interrupted; mouth small; canines small, close-set, those of the upper jaw very short, those of the lower jaw forming a cutting edge; large posterior canines present; fins low; dorsal rays IX, 11; anal rays III, 11, the spines short and pungent. Small fishes of the coral reefs allied to *Halichœres*, but the anterior canines much less developed and the posterior canine wanting. Coloration always exquisite.

(*στέθος*, breast; *Julis.*)

a. Head and body with distinct bright red stripes (gray in spirits), one along base of dorsal, one through eye to middle of caudal, one below eye to base of pectoral, and one along side of belly; a blue-black spot on opercle ... *psacas*, 22.

aa. Head and body without distinct red stripes.

b. Lower part of sides with yellowish longitudinal stripes and some black dots; a black spot at base of last dorsal ray ..... *strigiventer*, 23.

bb. Lower part of sides posteriorly, with leaden blue spots and markings; a dark band above pectoral anteriorly edged with pearly white ..... *terina*, 24.

bbb. Lower part of sides without spots or stripes; a brownish black lateral band, wider and less distinct anteriorly; a pale stripe below eye; a dark axillary spot ..... *trossula*, 25.

22. STETHOJULIS PSACAS Jordan and Snyder, new species.

Head $3\frac{2}{5}$ in length; depth $3\frac{1}{2}$; depth of caudal peduncle 3; eye $5\frac{1}{2}$ in head; interorbital space 4; snout $2\frac{3}{4}$; D. IX, 11; A. III, 10; scales in lateral series, 26; between lateral line and insertion of dorsal, 2; between lateral line and insertion of anal, 9.

Body rather elongate, greatly compressed, breast and back sharp, caudal peduncle narrow, dorsal and ventral outlines evenly rounded; head large, snout rather blunt, interorbital space convex. Eye nearer to tip of snout than to posterior edge of opercle, a distance equal to diameter of pupil. Jaws equal, lips thin, small, pendulous. Teeth in a single row in each jaw; blunt, incisor-like, two small canines at tip of each jaw, a posterior canine on each side of upper jaw. Preopercle smooth, opercle with a narrow angular flap. Pseudobranchiæ large; gill-rakers on first arch 9+15, short and pointed near middle of arch, growing stumpy toward the ends, the outer ones reduced to mere knobs. Scales large, those on breast below pectoral and before ventrals greatly enlarged, those on occiput and on base of pectoral very small; a narrow sheath of one row of small scales along base of dorsal; anal without sheath, small scales on base of caudal, the last scale of lateral line very large, pointed; head naked. Lateral line continuous, abruptly bent downward below base of soft dorsal, a

branch of lateral line forming a V across occiput at anterior border of scales. Spinous dorsal low, the spines rather strong, the posterior ones but little longer than the anterior ones, $3\frac{4}{5}$ in head, longest ray $3\frac{1}{5}$. Anal spines weak, the first minute, the third equal in length to diameter of eye; the longest ray $3\frac{1}{2}$ in head. Caudal rounded posteriorly, its length $1\frac{1}{2}$ in head. Ventrals short, reaching about half way between their base and anal opening. Pectorals inserted high up, the base nearly horizontal, making the fin point upward. Fin membranes all thin and transparent.

Color in spirits. A light grayish stripe, bright red in life, extending from snout through upper edge of eye, along side of body parallel with lateral line to middle of base of caudal, wider on body and lighter in color than on head; the stripe with a short fork on opercular flap, including a conspicuous brown spot; a similar, broader stripe

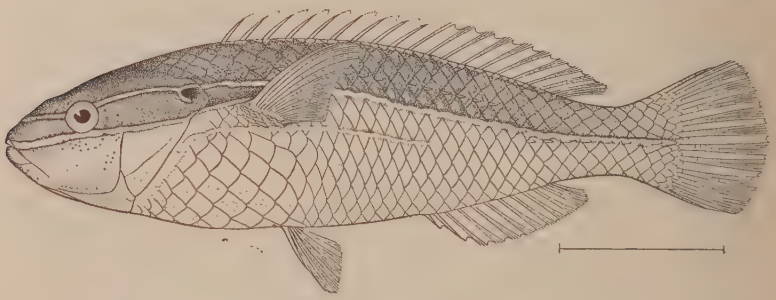

FIG. 5.—STETHOJULIS PSACAS.

from snout, below eye, across cheek, ending on body above lower edge of base of pectoral; a third line originating on edge of shoulder girdle, just behind gill-opening, passing upward, then curving backward below base of pectoral and ending on body at a point above insertion of anal; a faint stripe along base of dorsal not extending on head. Color above the lower stripe on head and anterior part of body, and above upper stripe on remainder of body, brownish, below the upper stripes the body is bluish gray, the scales indistinctly edged with dusky. Fins all plain.

A single specimen of this species, 115 millimeters long, was obtained from Nafa, in Okinawa, in the Riukiu Islands. It is registered as type No. 6850, Zoological Museum, Stanford University. The species is very near *Stethojulis renardi* Bleeker, but the markings are somewhat different.

(ψάκας, spot.)

23. STETHOJULIS STRIGIVENTER[1] Bennett.

Julis strigiventer BENNETT, Proc. Zool. Soc., 1832, p. 184; Ile de France.—CUVIER and VALENCIENNES, Hist. Poiss., XIII, 1837, p. 468 (after Bennett).

Stethojulis strigiventer BLEEKER, Atlas Ichth., 1862, p. 135, pl. XLIII, fig. 1; Bawean, Singapore, Celebes, Amboyna, Ceram, Timor, etc.—GÜNTHER, Cat. Fishes, IV, 1862, p. 140; Mauritius, Mozambique, Amboyna, Port Essington.—DAY, Fishes India, 1885, p. 397, pl. LXXXIV, fig. 7; Nicobars, Andamans.—ISHIKAWA, Prel. Cat., 1897, p. 29; Miyakoshima, one of the Riukiu Islands.

D. IX, 11; A. II, 11; scales in lateral line 26; in tranverse series 2+9. The height of the body is one-fourth the total length; the length of the head two-sevenths; caudal rounded; ventral rather short. Greenish, lower parts of the sides with several yellow, longitudinal lines and with some black dots; a brownish band from the mouth below the eye to the operculum; a black dot at the base of the penultimate dorsal ray; sometimes a small black spot on the base of the caudal fin. (Günther.)

There are no doubt three anal spines in this species, as in *Stethojulis albovittata* of the Hawaiian Islands, and in other species of the genus, the first spine being so small as to easily escape observation.

This species, common in the Indian region, is placed in the present list because a specimen from the Riukiu Islands is in the Imperial Museum of Tokyo.

(*striga*, stripe; *venter*, belly.)

24. STETHOJULIS TERINA Jordan and Snyder, new species.

Julis sp. No. 508 ISHIKAWA, Prel. Cat., 1897, p. 29; Boshu.

Head $3\frac{3}{5}$ in length; depth $3\frac{1}{4}$; depth of caudal peduncle $8\frac{1}{4}$; eye $5\frac{1}{2}$ in head; interorbital space $3\frac{1}{2}$; snout $2\frac{2}{3}$; D. IX, 11; A. III, 11; scales in lateral series 25; between lateral line and insertion of dorsal 3; between lateral line and insertion of anal 9.

Body rather elongate; compressed; caudal peduncle narrow, dorsal outline slightly arched, curving almost evenly from snout to caudal peduncle, there being no sudden descent at base of caudal fin. Head long, the snout pointed; jaws equal; interorbital space convex; eye small, nearer snout than edge of opercle, a distance equal to diameter of pupil. Lips thin, pendent, those of the lower jaw divided by a narrow median ridge. Teeth blunt, closely apposed, in a single series in each jaw, the anterior ones not enlarged nor canine-like; a strong canine projecting forward on each side of posterior part of upper jaw. Gill-membranes narrowly restricted to isthmus. Pseudobranchiæ

[1] The following species is recorded from Kobe in Karoli's list probably by error for *Stethojulis terina:*

STETHOJULIS INTERRUPTA (Bleeker).

Julis interrupta BLEEKER, Banda I, p. 252.

Stethojulis interrupta GÜNTHER, Cat. Fish., IV, 1862, p. 142; Amboyna.—BLEEKER, Atlas Ichth., p. 133, pl. XLIV, fig. 4; Celebes, Amboyna, Ceram, etc.—KAROLI, Prodr. Pisc. Asiæ, Orient, 1882, p. 28; Kobe (probably an error).

large; gill-rakers on first arch 7+12, very short, the outer 5 or 6 on lower limb reduced to mere projections. Preopercle smooth, opercle with a broad, terminal flap. Head naked, fins without basal sheath of scales, scales of breast not greatly reduced in size, those of nape very small and elongate. Lateral line complete, bent abruptly downward below base of dorsal fin. Dorsal spines slender, short, the longest $3\frac{1}{6}$ in head; rays scarcely longer than spines. First anal spine very small, concealed, the succeeding spines small and weak, the third contained $6\frac{1}{2}$ times in head; longest ray $3\frac{1}{3}$; caudal rounded, $1\frac{1}{2}$ in head. Upper rays of pectoral longest, $1\frac{1}{2}$ in head, the others gradually shorter. Ventrals rounded, short, not reaching much over halfway between their base and anal opening.

Color in spirits light, yellowish brown, darker on upper half of body; a dark band narrowly edged with white extending backward from upper edge of base of pectoral, becoming narrow, broken, and finally disappearing near tip of pectoral; four lines of small brown

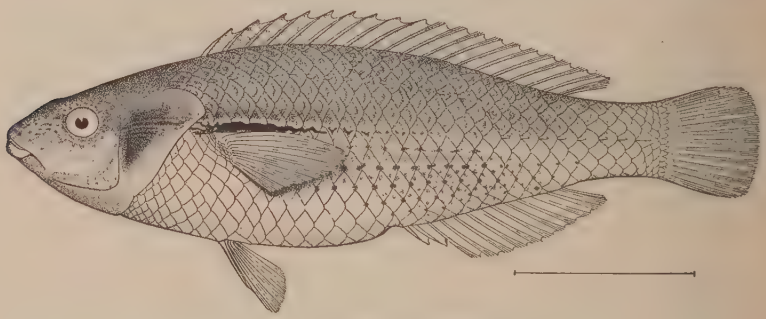

FIG. 6—STETHOJULIS TERINA.

spots, one on each scale, extending along sides of lower half of body, except the breast and belly; an indistinct, narrow, dark line extending from eye to edge of opercle; dorsal indistinctly mottled, the other fins plain. Males and females alike in color and other characteristics.

Described from a specimen about 105 millimeters long from Misaki. Other specimens of both sexes from Misaki, Wakanoura, and from Kominato, in Boshu, differ but slightly from the specimen described.

In life, the species is olive brown, the marks on side pearly white and blue black, the spots leaden blue; snout orange; base of pectoral marked by dull orange; fins reddish pearl.

This beautiful species is common about the tide pools and the rocks washed by the Kuro Shiwo. The species is very close to the *Stethojulis kalosoma* of the East Indies, but our specimens show none of the red or blue shades indicated in Bleeker's plate, and it is not probable that they belong to the same species. The type is No. 6851, Stanford Univ.

(τερήν, τέρεινα, exquisite.)

25. STETHOJULIS TROSSULA Jordan and Snyder, new species.

Head $3\frac{1}{2}$ in length; depth $3\frac{3}{4}$; depth of caudal peduncle 9; eye $5\frac{3}{4}$ in head; interorbital space 4; snout $2\frac{3}{5}$; D. IX, 11; A. III, 11; scales in lateral series 26; between lateral line and insertion of dorsal 3; between lateral line and insertion of anal 9.

Body elongate, caudal peduncle rather narrow, dorsal and ventral contours evenly curved, breast with a sharp ridge. Snout pointed, jaws equal, lower lip thin, pendulous, parted mesially into lateral lobes. Teeth in a single row, small, blunt, no anterior canines, a pair of strong posterior canines present. Edge of preopercle entire; opercle with a broad flap. Pseudobranchiæ large; gillrakers on first arch 6 + 15, most of those on the lower limb reduced to mere knobs; gill membranes well separated by a rather broad isthmus. Scales of breast like those of sides, not larger, those near gill openings small; scales on occiput and base of pectoral minute; dorsal and anal without basal sheaths; caudal with small scales on basal part; head naked.

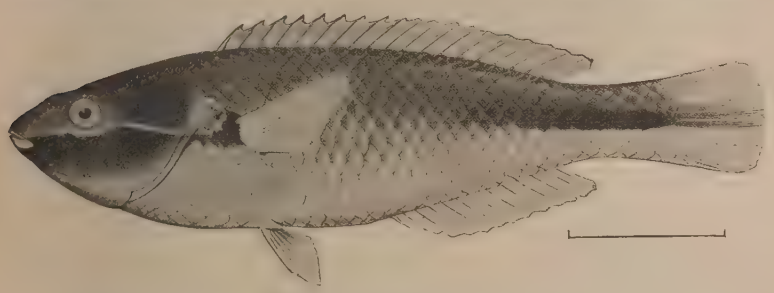

FIG. 7.—STETHOJULIS TROSSULA.

Lateral line complete, abruptly bent downward below base of soft dorsal. Dorsal spines low, moderately strong, the longest $4\frac{1}{2}$ in head, longest ray $2\frac{3}{4}$. First anal spine very small, concealed, the third $4\frac{1}{2}$ in head; longest ray $3\frac{1}{4}$. Caudal rounded, $1\frac{3}{4}$ in head. Ventrals reaching to within an eye's diameter of anal opening. Pectorals $1\frac{1}{2}$ in head. Membranes of fins thin and transparent, not thickened about the spines or rays.

Color in alcohol, chocolate brown above, much lighter below, the dark color ceasing abruptly a little above middle of sides, a broad brownish black band on caudal peduncle, which widens and becomes indistinct anteriorily; a dark patch bordered above and below with yellowish white, before base of pectoral; a dark spot on upper part of axil; head darker than body, the dark area extending to the lower edge of preopercle; a white stripe somewhat narrower than pupil extending from tip of snout, below eye, to edge of opercle; lower part of body with 4 indistinct, dark longitudinal stripes. Middle of caudal brownish; other fins plain.

Of this species we have but one specimen, which measures 120 millimeters, from Misaki. It is recorded as type No. 6852, Zoological Museum, Stanford University.

It is near *Stethojulis phekadopleura* Bleeker, of the East Indies, but differs in coloration, as it also differs from *S. terina*.

(*trossula*, a belle, or elegant young woman.)

14. HEMIGYMNUS Günther.

Hemigymnus GÜNTHER, Ann. Mag. Nat. Hist., 1861, p. 386 (*fasciatus*).

Body compressed, oblong, covered with rather large scales, 30 in lateral lines; lateral line continuous; opercles naked; cheek with a stripe of very small scales; preopercle entire. Lips thick and pendent; teeth uniserial; canines $\frac{2}{2}$; a posterior canine tooth; fin rays, D. IX, 11; A. II, 11. East Indies.

(*ἥμι*, half; *γυμός*, naked.)

26. HEMIGYMNUS MELAPTERUS (Bloch).

Labrus melapterus BLOCH, Ichthyologia VIII, p. 111, pl. CCLXXXV; Japan.

Tautoga melapterus CUVIER and VALENCIENNES, Hist. Poiss., XIII, 1837, p. 311; Java.—BLEEKER, Verh. Bat. Genootsch, XXII, p. 16.—RICHARDSON, Ann. Mag. Nat. Hist., 1843, XI, p. 358.

Hemigymnus melanopterus GÜNTHER, Cat. Fish., IV, 1862, p. 139; Celebes, Java, Port Essington, Endeavor Reef, Australia.—BLEEKER, Atlas Ichth., p. 142, pl. XLV, fig. 203; Java, Duizend Islands, Cocos, Sumatra, Batu, Nias, Singapore, Bintang, Celebes, Amboyna, Ceram, Goram.—DAY, Fishes India, p. 396, pl. LXXXIV, fig. 2, 1885; Andamans.—ISHIKAWA, Prel. Cat. 1897, p. 29; Riukiu Islands.

D. IX, 11; A. III, 11; scales in lateral line 29; in transverse series 5 + 14.

A posterior canine tooth hidden by the skin. Lips very thick, with folds; the lower lip is notched anteriorly, each lateral part pendent like a wattle. Cheek with a band of small scales. Back and sides between the vertical fins brownish, abdomen and thoracic region yellowish; a blackish blotch behind the orbit; dorsal and anal fins with a slight margin, and with a bluish intermarginal band edged with darker. (Günther).

This species is included in the present list because it was originally described from Japan and a specimen from Riukiu is now in the Imperial Museum.

(*μέλας*, black; *πτερόν*, fin.)

27. HEMIGYMNUS FASCIATUS (Thunberg).

Mullus fasciatus THUNBERG, Reise nach Japan, IV, 1791, p. 351, pl. CCCXIV; City of "Meaco" (doubtless Miyakoshima, Temple Island, one of the Riukiu group).

Labrus fasciatus BLOCH, Ichthyol., VIII, p. 6, pl. CCXC, about 1792; Japan.

Tautoga fasciata CUVIER and VALENCIENNES, Hist. Poiss., XIII, 1837, p. 303, pl. CCCLXXIX; Ile de France.

Hemigymnus fasciatus GÜNTHER, Ann. Mag. Nat. Hist., 1861, p. 386.—BLEEKER, Atl. Ichth., 1862, p. 141, pl. XLVI, fig. 2; East Indies, Mauritius, Ceylon.—GÜNTHER, Cat. Fish., IV, 1862, p. 138; Amboyna.—DAY, Fish. India, 1885, p. 396.

Sparus fuliginosus LACÉPÈDE, Hist. Poiss., III, 1802, p. 437; Ile de France.

Sparus malapteronotus LACÉPÈDE, Hist. Poiss., III, 1802, p. 450; Ile de France.

Sparus zonephorus LACÉPÈDE, Hist. Poiss., IV, 1803, p. 155 (after Bloch).

Sparus meaco LACÉPÈDE, Hist. Poiss., IV, 1803, p. 161 (after Thunberg).

Scarus quinquefasciatus BENNETT, Fishes Ceylon, 1839, pl. XXIII; Ceylon.

? Tautoga mertensi CUVIER and VALENCIENNES, Hist. Poiss., XIII, 1837, p. 308; Carolines.

Cheilinus blochi CUVIER and VALENCIENNES, Hist. Poiss., XIV, 1837, p. 108 (after *Labrus fasciatus* Bloch).

? Tautoga leucomos BLEEKER, Bliliton, IV, p. 239; Bliliton.

? Hemigymnus leucomus GÜNTHER, Cat. Fish., IV., 1862, p. 139.

D. IX, 11; A. III, 11; scales in lateral line 30; in transverse series 5 + 11. A posterior canine tooth. Lips very thick, with folds; the lower lips are notched anteriorly, broad, pendent, like wattles; cheek with a band of small scales. Body with 5 brownish-black cross bands; ventral and anal blackish; the lower half of the soft dorsal yellowish, the upper blackish. A brownish spot behind the eye. (Günther.)

This species is here included because it was originally described from Japan, doubtless from the island of Myiako in the Riukiu. This must be near its northern limit.

(*fasciatus*, banded.)

13. GÜNTHERIA Bleeker.

Güntheria BLEEKER, Proc. Zool. Soc. Lond., 1861, p. 412 (*trimaculatus*).

? Hemitautoga BLEEKER, Proc. Zool. Soc. Lond., 1861, p. 413 (*centiquadra*).

This genus differs from *Halicheres* in the presence of small scales on the cheeks behind the eyes; base of dorsal with a more or less distinct scaly sheath. Bleeker divides the genus into two: *Güntheria*, with two canines in the lower jaw, and *Hemitautoga*, with four. The two differ otherwise but slightly, and both are near *Platyglossus* and *Halicheres*.

(Named for Dr. Albert Günther.)

28. GÜNTHERIA TRIMACULATA (Quoy and Gaimard).

Julis trimaculata QUOY and GAIMARD, Voyage Astrolabe, Zool., II, 1834, p. 705, pl. XX, fig. 2; Vanicolo.—CUVIER and VALENCIENNES, Hist. Poiss., XIII, 1837, p. 452; Vanicolo.

Güntheria trimaculata BLEEKER, Atlas Ichth., p. 138, pl. XXXII, fig. 1; East Indies.

Platyglossus trimaculatus GÜNTHER, Cat. Fish., IV, 1862, p. 153; East Indies.—ISHIKAWA, Prel. Cat., 1897, p. 29; Riukiu Islands.

Julis spilurus BLEEKER, Banda, I, p. 252; Banda.

D. IX, 11; A. III, 11; scales in lateral line 29; in transverse series 10 + 15. The height of the body equals the length of the head, and is rather more than one-fourth of the total. Caudal truncated; head

with a broad bluish band from the snout, below the eye, bent downward across the operculum and suboperculum; several other oblong spots above this band; a crescent on the interoperculum and the margin of the suboperculum bluish; an oblique white streak from the axil to the belly. Each scale with a bluish vertical streak; a dark brown spot near the root of the caudal, above the lateral line; sometimes one or two other brown spots on the side of the body. Dorsal with three, anal with two longitudinal lines, which are whitish in spirits; a small black spot superiorily in the axil. (Günther.)

This species is represented in the Imperial Museum by a specimen from Riukiu.

(*tres*, three; *maculatus*, spotted.)

16. HALICHŒRES[1] Rüppell.

Halichœres Rüppell, Neue Wirbelthiere Fische, 1837, p. 16 (*bimaculatus*, not *Halichœrus* Nilsson, 1820, a genus of seals).

Ichthycallus[2] Swainson, Nat. Hist. Classe Fishes, II, 1839, p. 232 (*dimidiatus*).

Chœrojulis Gill, Proc. Ac. Nat. Sci. Phila., 1862, p. 142 (substitute for *Halichœres*, regarded as preoccupied).

Parajulis Bleeker, Enum. Poiss. de Japan, 1879, p. 5, (*pœcilopterus*, no definition.)

Iridio Jordan and Evermann, Check List Am. Fishes, 1896, p. 412 (*radiatus*).

Body oblong, compressed, not elevated, covered with large scales, there being 25 to 30 in the course of the lateral line, which is not interrupted, but bent abruptly behind; scales on breast a little smaller. Head scaleless, compressed conic; preopercle entire. Teeth large, two to four strong canines in front of each jaw, a posterior canine tooth. Fin rays usually D. IX, 11; A. III, 11; fins low; caudal lunate, truncate or rounded; ventrals inserted under axil of pectoral. Gill-rakers short and feeble; gill membranes slightly joined to the narrow isthmus; no scaly sheath at base of dorsal. Vertebræ 10+15=25. Species numerous, of rather small size and gay coloration, the typical species (with canines $\frac{4}{4}$) all belonging to the East Indies and Polynesia, those with canines $\frac{2}{4}$ (*Ichthycallus*) being all American.

(ἅλς, sea; χοῖρος, pig).

I. Halichœres: canines $\frac{4}{4}$.

a. Dorsal spines relatively firm and low, the longest 3 in head; depth $3\frac{1}{2}$ in length; anterior canines strong, dorsal rays IX, 14; anal rays IX, 14; males with a brownish lateral band, a large brown spot near end of pectoral; head with light blue markings; female with a blackish lateral band and a similar dark streak above it at base of dorsal extending forward to snout, besides several lines of dark spots ..... *pœcilopterus*, 29.

[1] *Platyglossus* (Klein) Bleeker (*marginatus*), differs from *Halichœres* in the presence of a scaly sheath at base of dorsal.

[2] The first species named under *Ichthycallus* (*dimidiata*) belongs to the group called *Iridio*. The name *Ichthycallus* may be restricted to that species and its affinities, replacing *Iridio*, if this subgenus (composed of American species with the canines $\frac{2}{4}$) is deemed worthy of recognition.

aa. Dorsal spines high and very slender, the longest about 2¼ in head; depth about 4 in length; anterior canines small; dorsal rays IX, 12; anal rays III, 12; a black axillary spot.

b. Dorsal fin (in male) blotched and edged with black; sides with a pale lateral shade; caudal dark with pale edges; anal dark at base, with three longitudinal bands ..... *bleekeri*, 30.

bb. Dorsal fin mottled, but without black spot or edging; no distinct color markings except the black axillary spot ..... *tremebundus*, 31.

29. HALICHŒRES PŒCILOPTERUS (Schlegel).

AOBERA (BLUE BERA) MALE; AKABERA (RED BERA) FEMALE.

Julis pœcilopterus SCHLEGEL, Fauna Japonica, Poiss, 1846, p. 169, pl. LXXXVI bis. fig. 1; Nagasaki (male).—RICHARDSON, Ichthyol. China, 1846, p. 260; Canton.—BREVOORT, Exped. Japan, 1856, p. 271; Shimoda.

Platyglossus pœcilopterus GÜNTHER, Cat. Fish., IV, 1862, p. 166; China.—KAROLI, Prodrom. Pisc. Asiæ, Orient, 1882, p. 28; Hakuri.—STEINDACHNER, Fische Japans, IV, 1887, p. 19; Tokyo; Reise Aurora, 1896, p. 215; Kobe.—ISHIKAWA, Prel. Cat., 1897, p. 28; Tokyo, Boshu.—JORDAN and SNYDER, Proc. U. S. Nat. Mus., 1900, p. 756; Yokohama; Proc. U. S. Nat. Mus., 1900, p. 359; Tokyo.

Halichœres pœcilopterus JORDAN and SNYDER, Check List, 1901, p. 87; Yokohama,

Julis pyrrhogramma SCHLEGEL, Fauna Japonica, Poiss., 1846, p. 170, pl. LXXXVI bis. fig. 2; Nagasaki (female).

Platyglossus pyrrhogramma GÜNTHER, Cat. Fish., IV, 1862, p. 166, after Schlegel.—KAROLI, Prodr. Pisc. Asiæ Orient., 1882, p. 28; Yokohama, Hakuri.—STEINDACHNER, Fische Japans, IV, 1887, p. 19; Tokyo, Tango; Reise Aurora, 1896, p. 214; Kobe.—ISHIKAWA, Prel. Cat., 1897, p. 29; Tokyo, Boshu.

Halichœres pyrrhogrammus JORDAN and SNYDER, Proc. U. S. Nat. Mus., 1900, p. 359; Tokyo; Check List, 1901, p. 87; Yokohama.

Julis thersites RICHARDSON, Ichth. China, 1846, p. 260; Canton.

Head 4$\frac{1}{10}$ in length; depth 3½; depth of caudal peduncle 7½; eye 6 in head; interorbital space 4$\frac{1}{10}$; snout 2$\frac{3}{4}$; D. IX, 14; A. III, 14; scales in lateral series 26, between lateral line and insertion of dorsal 3, between lateral line and insertion of anal 8.

Body elongate, compressed, the dorsal contour not elevated. Interorbital area very convex, eye slightly nearer to tip of snout than to edge of opercle. Snout pointed, the jaws equal, the mouth rather small. Teeth in a single series laterally, coalesced at bases, the tips distinct; a large fang projecting forward from posterior part of upper jaw; four large curved canines in anterior part of both jaws, the two middle ones of upper jaw largest. Edge of preopercle entire. Opercle with a large flap. Gill rakers on first arch 6+9 short, pointed.

Scales before dorsal small in about seven rows, crossing the median line. Head entirely naked; fins without sheath at base. Lateral line complete, abruptly bent downward below base of soft dorsal.

Membrane of spinous dorsal not incised, the spines relatively firm, longest spine 3 in head, longest ray 2½. Anal spines weak, the second 5½ in head, longest ray 2½. Caudal rounded, its length 1¼ in head; length of pectoral 1⅔; ventral 1½ in head, short, not filamentous, not reaching vent.

Color in spirits; male, light yellowish brown, a brownish band a little wider than orbit, extending along back, a similar band below the lateral line, extending from gill opening to base of caudal; a large dark brown spot on body below end of pectoral; scales of body anterior to the brown spot, and below the median dark band, with large light spots; head with elongate spots and longitudinal light blue bars bordered with dark brown, one extending between tip of snout and eye, another along cheek and side of head; an indistinct greenish band running obliquely backward and downward from occiput. Dorsal with broad dusky reticulations, which inclose round bluish-white spots on greater part of fin, leaving a light band near the dusky margin; anal similar in color; caudal with vertical light bars, which are in places broken up into spots; ventrals and pectorals plain.

Described from a male specimen 230 millimeters long from Nagasaki.

The females differ strikingly from the males in color. Body with a sharply defined dark brown band, overlaid with red, one half a scale in width, extending from tip of snout to base of caudal; below this at intervals about equal to the band in width are two dark broad lines, the lower indistinct; above the band, with intervals about equal to its width, are two rows of dark spots, one on the anterior part of each scale, the spots and lines not extending on head; above the dots a dark brown band similar to the median one runs from snout to end of dorsal fin, where it unites with its fellow on the opposite side, and extends along upper edge of caudal peduncle; on the upper part of head the bands are united on the snout and broken into two oblong bars on the occiput. Fins orange in life, the dorsal with a slight clouding of dusky.

This species is found in shallow bays and about rocks everywhere in Japan from Hakodate southward. Both males and females are brightly colored and the two sexes are quite unlike in pattern. For this reason the two have been accepted as distinct species without any question until the present time. Their identity has been shown by dissection of many examples. Our specimens in all cases representing both sexes are from Aomori, Matsushima, Tokyo, Misaki, Wakanoura, Kobe, Onomichi, Hiroshima, Tsuruga and Nagasaki.

(*ποικιλός*, variegated: *πτερόν*, fin.)

30. HALICHŒRES BLEEKERI (Steindachner and Döderlein.)

HONBERA (ORIGINAL BERA).

?Platyglossus tenuispinis GÜNTHER, Cat. Fish., IV, 1862, p. 161; China Sea (perhaps a faded female, but the ventrals said to be shorter than the pectorals and the dorsal spot on three spines only).—KAROLI, Prodr. Pisc. As., Orient, 1882, p. 28; Nagasaki.

Platyglossus bleekeri STEINDACHNER and DÖDERLEIN, Fische Japans, IV, 1837, p. 19; Tokyo.

Halichœres bleekeri JORDAN and SNYDER, Proc. U. S. Nat. Mus., 1900, p. 359, Tokyo; Check List, 1901, p. 87; Yokohama.

Head 4 in length; depth 4; depth of caudal peduncle 7; eye $4\frac{1}{2}$ in head; snout $2\frac{3}{5}$; interorbital space $4\frac{1}{4}$; D. IX, 12; A. III 12; scales in lateral series 25, between lateral line and insertion of dorsal 2, between latarel line and insertion of anal 8.

This species is characterized by its slender body, high and flexible dorsal spines and the small number of dorsal and anal rays. Canines very small, scarcely differentiated, $\frac{4}{4}$. Scales before dorsal small, crossing the median line in about 8 rows.

Longest dorsal spine 2 in head, very slender; longest ray $2\frac{1}{5}$. Anal spines short, slender, the second about equal to diameter of eye; longest ray $2\frac{1}{2}$ in head. Caudal rounded. Outer ray of ventral filamentous, longer than the pectoral, at least in the male.

Color in spirits brownish, shaded with blue, an indefinite light band extending along side of body; head with two dark bands, one below eye, the other above, occasionally one or both are very indistinct or absent; a small black blotch at upper edge of base of pectoral; dorsal broadly bordered with brownish, the border growing wider anteriorly, where it is almost black, the base of fin with a row of large round light spots, which in some specimens are united to form a band; caudal dark, the dorsal and ventral edge light; anal with three broad longitudinal bands, separated by very light lines, the basal band dark, the outer ones slighter; ventrals and pectorals plain.

The female is unknown to us. Of 24 specimens about 150 millimeters long from 6 localities all are males. It is possible that *Halichœres tenuispinis* (Günther), with the black on the dorsal restricted to a single spot and the ventrals not filamentous and shorter than the pectorals, may prove to be the same species.

This species is generally common throughout southern Japan, and may be recognized by the height and slenderness of the dorsal spines and the dark color of the fins.

Our specimens are from Tokyo, Misaki, Kobe, Onomichi, Hiroshima, and Nagasaki.

(Named for Dr. Pieter van Bleeker.)

31. HALICHŒRES TREMEBUNDUS Jordan and Snyder, new species.

Head $3\frac{2}{10}$ in length; depth $4\frac{1}{8}$; depth of caudal peduncle $7\frac{1}{3}$; eye $4\frac{1}{2}$ in head; interorbital space 4; snout $2\frac{5}{8}$; D. IX, 12; A. III, 12; scales in lateral series 25; between lateral line and insertion of dorsal 1 or 2; between lateral line and insertion of anal 9.

Body elongate, compressed, dorsal outline not elevated, upper anterior profile evenly curved from tip of snout to origin of dorsal fin, the caudal peduncle deep. Head pointed, snout sharp, the jaws equal. Teeth in a single series laterally, closely apposed but not coalesced, growing gradually larger toward tip of snout, the anterior canines not much enlarged, $\frac{4}{4}$, a few minute teeth behind the canines; a small

posterior canine present. Pseudobranchiæ large; gill-rakers on first arch 3 + 9, small, pointed. Eye nearer to tip of snout than to edge of opercle a distance about equal to two-thirds its diameter. Edge of preopercle smooth, opercle with a flap equal in length to diameter of eye. Lips thin, the lower one pendant on the sides of mouth, divided anteriorly. Scales before dorsal small in 6 or 8 rows, crossing the median line.

Scales not forming a sheath at base of fins, smaller on belly than on upper parts, very small on nape and breast; head entirely naked. Lateral line complete, abruptly bent downward below base of soft dorsal.

Membrane of spinous dorsal not incised, the spines slender, short, the longest $2\frac{1}{4}$ in head; dorsal rays slightly higher than spines. Anal spines very small and weak, the third about $3\frac{1}{2}$ in head, longest ray 2. Dorsal and anal rays when depressed not reaching base of caudal. Caudal rounded, $1\frac{1}{5}$ in head. Pectoral rather truncate posteriorly, $1\frac{2}{5}$ in head. Ventrals filamentous, $1\frac{3}{4}$ in head.

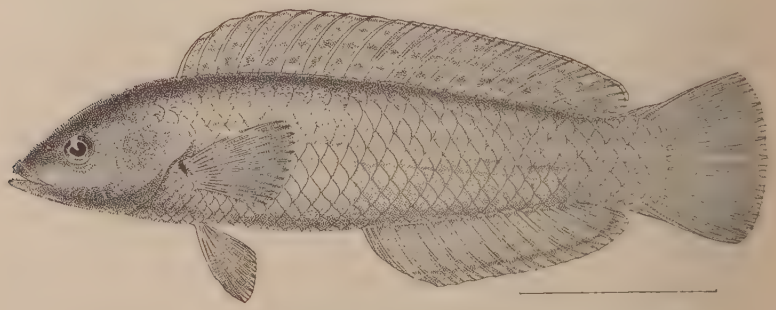

FIG. 8.—HALICHŒRES TREMEBUNDUS.

Color in spirits, dusky above, lighter below; a small, distinct brownish black spot on upper edge of base of pectoral; dorsal pale, mottled with pale brownish, without black spot or edging; iris green.

Described from a specimen about 100 millimeters long, Type No. 6853, Leland Stanford Junior University Museum, from Hiroshima. We have examined both males and females and find no external differences.

It is one of the smallest and slenderest species of the genus, differing principally in color and in greater slenderness from *H. blochii*. We have 15 specimens, from Misaki, Hiroshima, Kobe, Wakanoura, Onomichi, and Nagasaki.

(*tremebundus*, timid.)

17. CORIS Lacépède.

Coris LACÉPÈDE, Hist. Nat. Poiss., III, 1802, p. 96 (*aygula*).

Body compressed, oblong, covered with moderate or small scales, about 60 in the lateral line; head scaleless; lateral line not interrupted;

posterior canine tooth absent; fin rays, dorsal IX, 12; anal III, 12; anterior dorsal spines usually produced and flexible; caudal rounded.

Polynesia, the species few; deeply colored fishes of the coral reefs.

The genus *Coris*, as understood by Günther, differs from *Halichœres* in its small scales. It comprises a great variety of forms, and is divisible into six well-marked genera or subgenera, distinguished as follows:

a. Scales in lateral line 50 to 85.
  b. Posterior canine obsolete; head naked; caudal rounded; scales 60.....*Coris.*
  bb. Posterior canine present.
    c. Head with a patch of scales behind the eye; caudal rounded; scales 50.
Ophthalmolepis.
    cc. Head entirely naked.
      d. Caudal rounded or truncate.
        e. Scales 55 to 65.....*Hemicoris.*
        ee. Scales 70 to 85.....*Julis.*
      dd. Caudal forked, the lobes much produced in the adult; scales 73.
Pseudocoris.
aa. Scales in lateral line about 120; body oblong; head naked; no posterior canine.
Hologymnosus.

Of these groups we here recognize *Coris*, *Julis*, *Ophthalmolepis* (*lineolata*), and *Hologymnosus* (*fasciatus*) as distinct genera. It is not unlikely that *Pseudocoris* (*heteroptera*) is entitled to similar rank.

(*Coris*, a helmet, from the adipose hump on the forehead in old individuals of *Coris aygula*, "à cause de l'éspece de casque qui envelope et surmounte la tete," the first dorsal spines being compared to the plume in the helmet.)

a. Scales in lateral line 50 to 60; posterior canine obsolete or nearly so.
  b. Anterior dorsal rays much produced; body robust; color blue-black almost uniform.....*aygula*, 32.

32. CORIS AYGULA Lacépède.

Coris aygula Lacépède, Hist. Nat. Poiss., III, 1802, p. 96, pl. IV, fig. 1; Ile de France.—Günther, Cat. Fish., IV, 1862, p. 201; Red Sea, India, Australia.—Day, Fish. India, 1885, p. 408 (with a figure representing some species of *Hologymnosus*).

Coris angulata Lacépède, Hist. Nat. Poiss., III, 1802, p. 96, pl. IV, fig. 2; Ile de France (dorsal spines not produced).

Julis gibbifrons Quoy and Gaimard, Voy. Astrolabe, Poiss., 1834, p. 707, pl. XIX, fig. 3; Ile de France.

Julis coris Cuvier and Valenciennes, Hist. Nat. Poiss., XIII, 1839, p. 491; Ile de France.

Head 3¼ in length; depth 3; depth of caudal peduncle 6; eye 7 in head; snout 2½; interorbital space 3⅔; D. IX, 12; A. III, 12; scales in lateral series 61; between lateral line and insertion of dorsal 5; between lateral line and insertion of anal 24.

Body moderately compressed, caudal peduncle deep, dorsal contour ascending rapidly from tip of snout to insertion of dorsal, ventral outline more gently and evenly curved, interorbital space convex.

Snout short, bluntly pointed, jaws equal, lower lip thin, divided into 2 lateral pendent lobes. Teeth closely apposed or coalesced at base, the points distinct, in a single series, 2 strong blunt canines on tip of each jaw, 2 or 4 smaller teeth in a row behind the canines; no posterior canines present. Preopercle entire, opercle with a broad flap, its length 5 in head. Gill-rakers on first arch 6 + 11, moderately long, slender, pointed; pseudobranchiæ large.

Scales moderate, much reduced on nape and on pectoral region, dorsal and anal fins without basal sheath, small scales extending far out on interradial membranes of caudal, head naked. Lateral line complete, abruptly bent downward below base of soft dorsal.

Dorsal spines long and slender, not pungent, the longest $2\frac{1}{2}$ in head, longest ray $1\frac{1}{3}$; anal spines similar to those of dorsal, the rays equal to those of dorsal in length; the membranes of both fins thick. The caudal and pectorals of our specimen are so worn, it having been confined in a floating basket, that their shape and length can not be determined. Outer rays of ventrals lengthened, the fins reaching base of first anal ray.

FIG. 9.—CORIS AYGULA.

Color in alcohol, uniform blue-black, the scales with a somewhat lighter edge, the fins much darker than the body.

Color in life deep green, the scales edged with brownish; a bluish green vertical band behind end of depressed pectoral; caudal with a wash of blue on posterior parts, dorsal and anal with golden brown reticulations.

One specimen of this fine species was obtained at Wakanoura.

(*aygula* is defined as egret by Lacépède; the long dorsal spines being compared to a plume on a helmet.)

18. JULIS Cuvier.

Julis CUVIER, Règne Animal, 1st ed., I, 1817, p. 261 (*julis*).
Hemicoris BLEEKER, Proc. Zool. Soc. Lond., 1861, p. 412 (*variegata*).
?Pseudocoris BLEEKER, Proc. Zool. Soc. Lond., 1861, p. 412 (*heteroptera*.)

The genus as here understood differs from *Coris* chiefly in the presence of the posterior canine tooth. The body is usually more elongate than in *Coris*, and the scales are frequently smaller (55 to 85). In most species the anterior dorsal spines are slender and prolonged. Brilliantly colored fishes of the coral reefs, some of the species burying themselves in the sand. The name *Julis*, originally based on the Girelle of the Mediterranean (*Julis julis*), has been wrongly transferred to the genus *Thalassoma* by Bleeker and Günther.

(*ιοῦλος*, violet.)

33. JULIS FORMOSA (Bennett).

Labrus formosus BENNETT, Fishes Ceylon, No. 16, 1830; Ceylon.
Coris formosa GÜNTHER, Cat. Fish., IV, 1862, p. 201; after Bennett.
?Coris formosa BLEEKER, Atlas Ichthy., 1862, p. 99, pl. XIX, fig. 3; Celebes; Amboyna.—? DAY, Fishes India, 1885, p. 407, pl. LXXXVI, fig. 5; Malay Archipelago.
?Coris pulcherrima GÜNTHER, Cat. Fish., IV, 1862, p. 200; Amboyna, Tahiti, Aneitum.
Coris pulcherrima ISHIKAWA, Prel. Cat., 1897, p. 28; Riukiu Islands.

D. IX, 12; A. III, 12 (scales about 80). The anterior dorsal spines produced; caudal rounded; ventral long, pointed. Posterior canine present. Bluish-gray, with circular black spots; head yellow, with 2 oblique blue bands ascending toward the origin of the dorsal, one beginning from the snout and passing through the eye, the other parallel to the first, running below the eye. Dorsal and anal fins brown, the former with red margin, and with 2 green lines running within the red; black dots between the rays. Anal with a narrow green edge and a narrow green intramarginal line; a series of green dots within the margin. The inner half of the caudal red, the outer yellowish-white. (Günther after Bennett).

One specimen of this species from Riukiu is in the Imperial Museum at Tokyo. As the synonomy of this and related species is still uncertain, we copy the substance of the original account, not having examined the specimen recorded by Ishikawa.

(*formosus*, comely.)

19. CHEILIO Lacépède.

Cheilio (Commerson) LACEPÈDE, Hist. Nat. Poiss., IV, 1803, p. 432 (*auratus*).
Hemiulis SWAINSON, Nat. Hist. Fishes, II, 1839, p. 228 (*vittatus*).
Eupemis SWAINSON, Nat. Hist. Fishes, II, 1839, p. 232 (*fusiformis*).

Body elongate, compressed, covered with rather small scales, 45 to 50 in the lateral line; lateral line continuous; cheeks scaleless; a few rudimentary scales on the opercle; teeth small, in one series; no posterior canines; dorsal spines flexible; fins not produced. Fin rays, dorsal IX, 13; A III, 11. Polynesia to Africa, apparently a single species, varying much in color.

(*χεῖλος*, lip.)

34. CHEILIO INERMIS (Forskål).

Labrus inermis FORSKÅL, Descr. Anim., 1775, p. 34; Red Sea.

Cheilio inermis BLEEKER, Atlas Ichth., 1862, p. 82, pl. XXXI, fig. 4; Java, Bawian, Sumatra, Celebes, Tonga, Ternate, Amboyna, Banda, Ceram, Goram, Buro, Timor, Letti.—GÜNTHER, Cat. Fish., IV, 1862, p. 194; Mozambique, Macassar, Amboyna, Philippines, Aneitum.—DAY, Fish. India, 1885, p. 407, pl. LXXXVIII, fig. 4; Malay Archipelago.—JORDAN and EVERMANN, Fishes Formosa Ms.; Formosa.

Labrus hassek LACÉPÈDE, Hist. Poiss., III, 1802, p. 513 (after Forskål).

Cheilio auratus LACÉPÈDE, Hist. Poiss., IV, 1803, p. 433; Ile de France.—QUOY and GAIMARD, Voy. Uranie, Zool., 1824, p. 274, pl. LIV, fig. 2; Maui (Hawaii).—CUVIER and VALENCIENNES, Hist. Poiss., XIII, 1837, p. 341; Ile de France.

Cheilio fuscus LACÈPÈDE, Hist. Poiss., IV, 1803, p. 433; Ile de France.—CUVIER and VALENCIENNES, Hist. Poiss., XIII, 1837, p. 349 (same type).

Labrus fusiformis RÜPPELL, Neue Wirbelthiere Fische, 1837, pl. VII, fig. 4; Djedda, Massuah.

Cheilio cyanochloris CUVIER and VALENCIENNES, Hist. Poiss., XIII, 1857, p. 349; Ile de France.

Cheilio forskalii CUVIER and VALENCIENNES, Hist. Poiss., XIII, p. 349 (after *inermis* of Forskål.)

Cheilio hemichrysos CUVIER and VALENCIENNES, Hist. Poiss., XIII, p. 351; Mau (after *auratus* Quoy and Gaimard).—BREVOORT, Exped. Japan, 1856, p. 272; Riukiu.

Cheilio viridis CUVIER and VALENCIENNES Hist. Poiss., XIII, p. 352; Vanicolo.

Cheilio microstoma CUVIER and VALENCIENNES, Hist. Poiss., p. 353; locality unknown.

Cheilio ramosus JENYNS, Voyage Beagle, Fishes, 1842, p. 102.

Cheilio bicolor BIANCONI, Zool. Mozambique, p. 254, pl. v, Mozambique.

Head 3⅓ in length; depth 7; depth of caudal peduncle 3¼; eye 7½ in head; interorbital space 7½; snout 2½; D. IX, 13; A. III, 12; scales in lateral series 46; between lateral line and base of dorsal 5; between lateral line and base of anal 9.

Body very elongate, moderately compressed, caudal peduncle deep; head very long and pike-like; snout long, pointed, the lower jaw slightly shorter than the upper, the lower lip thin and pendent. Teeth in a single row on each jaw, the posterior ones small close set, the anterior ones larger, two small canines at tip of upper jaw. Preopercle smooth, opercle with a large rounded flap. Gill-rakers on first arch 7 + 19, those on upper limb short, pointed, the lower ones mostly long, very slender, some of the long ones with a minute one between them; pseudobranchiæ very large.

Scales small, somewhat reduced on nape and breast, no sheath along bases of dorsal and anal fins, head naked except a few scales on posterior edge of opercle. Lateral line complete, gently curving downward on anterior half, running along middle of body posteriorly.

Spines of dorsal slender, with soft tips, the longest 3¾ in head; longest rays 3. Anal spines weak, longest ray 3 in head. Caudal

rounded; ventral 3½ in head, not reaching half way between their base and the vent; pectorals 2¼ in head. Fin-membranes thin, transparent, not thickened about the spines or rays.

Color in life (taken from specimens from Hawaii) olive green, varying toward rusty red, each scale with a more or less distinct blue spot, bluish shades predominating below; head with various streaks and reticulations of olive, brownish, and pearly blue; middle of side with a narrow, dark streak which breaks up posteriorly into a row of blackish spots; dorsal light orange, the color forming reticulations around pearly spots; anal similar to dorsal; caudal olive gray with a paler cross band. Some examples were olivaceous orange rather than greenish, the dark lateral band very distinct and traceable across eye to tip of snout.

In spirits the bright colors disappear, the upper parts are darker than the lower, the dusky color ending abruptly along a dark lateral stripe, or if the stripe is wanting the dark color disappears gradually; each scale with a central light spot, a dark spot sometimes present on lateral line posterior to tip of pectoral; middle of caudal dusky.

Here described from specimens about 300 millimeters long obtained at Honolulu. This common and widely diffused species reaches the Riukiu Islands, a specimen before us having been taken at Nafa, in Okinawa. As this specimen is faded, only a trace of a pale lateral blotch being visible, we have drawn our account of the color from examples taken in Hilo, Hawaii, certainly of the same species. The colors vary greatly in life, some being largely yellow, others mostly olive green, often with green flesh and bones. The orange or black or brown lateral band varies much, being often broken into spots, or in old examples obsolete. Occasionally a pink blotch is seen behind the pectoral fins.

We have also a specimen from Formosa.

(*inermis*, unarmed.)

20. THALASSOMA Swainson.

Thalassoma Swainson, Nat. Hist. Classif. Fishes, II, 1839, p. 224 (*purpurea*).
Chlorichthys Swainson, Nat. Hist. Classif. Fishes, II, 1839, p. 232 (*bifasciatus*).
Julis Günther, Cat. Fish., IV, 1862, p. 179 (*pavo*), not of Cuvier, Règne Anim., 1st ed., 1817, p. 261, type, *julis*.

Body oblong or elongate, moderately compressed, covered with large scales; lateral line continuous; head scaleless; a slight sheath of scales along base of dorsal; no posterior canine; dorsal spines slender, the number always eight; anal spines three, the first very small. Lower pharyngeals essentially as in *Halichoeres*. Beautiful fishes of the coral reefs and warm currents, the coloration largely deep green or blue.

(θάλλω, a green branch; σῶμα, body, from the green coloration of the typical species.)

a. Caudal truncate, the lobes not produced; pectoral dusky at tip; color dark bluish green, with two black lateral shades and other markings; head with red stripes radiating from eye; fins largely red ..... *cupido*, 35.

aa. Caudal lunate, with the angles produced.

b. Back without dark cross bars; traces of oblique bands below pectoral; pectoral with a large black blotch at tip; head with dark stripes ..... *lutescens*, 36.

bb. Back with 6 black cross bars; head with radiating red bands; pectoral without distinct dark spot; body and fins more or less variegated ..... *dorsale*, 37.

35. THALASSOMA CUPIDO (Schlegel).

NISHIKIUWO (BROCADE-FISH).

Julis cupido SCHLEGEL, Fauna Japonica Poiss., 1846, p. 170, pl. LXXXVI bis, fig. 3; Nagasaki.—BLEEKER, Verh. Bot. Gen., XXI, Labr., p. 30.—? GÜNTHER, Cat. Fish., IV, 1862, p. 181; Batavia, probably not of Schlegel.—BLEEKER, Alt. Ichth., p. 39, pl. XXXIII, fig. 1.—STEINDACHNER and DÖDERLEIN, Fische Japans, IV, 1887, p. 20; Tokyo.

Thalassoma cupido JORDAN and SNYDER, Check List, 1901, p. 88.

Julis quadricolor BREVOORT, Exped. Japan, 1856, p. 272, pl. VIII, fig. 2; Shimoda, not *Julis quadricolor* of Lesson.

Thalassoma quadricolor JORDAN and SNYDER, Check List, 1901, p. 88; after Brevoort.

Head $3\frac{4}{5}$ in length; depth $3\frac{1}{2}$; depth of caudal peduncle $1\frac{2}{3}$; eye 6 in head; interorbital space $3\frac{2}{3}$; snout $2\frac{2}{3}$; D. VIII, 13; A. III, 11; scales in lateral series 25; between lateral line and insertion of dorsal 2; between lateral line and insertion of anal 8.

Body elongate, caudal peduncle deep, the head short. Teeth in a single series, canine-like anteriorly, gradually growing shorter posteriorly; no posterior canines. Preopercle smooth; opercle with a flap, the posterior edge of which is concave; gill-membranes forming a narrow fold across isthmus. Gill-rakers on first arch 6+8, short, pointed, those near the limbs much reduced.

Head naked; dorsal and anal with just the suggestion of basal sheaths, scales of nape and breast not greatly reduced in size. Lateral line complete, abruptly bent downwards below base of soft dorsal.

Membrane of dorsal fin not incised, spines slender, low, the highest contained about $3\frac{3}{4}$ in head; longest ray $2\frac{1}{2}$. First anal spine minute, concealed in the thick membrance, more distinct in younger individuals, the third spine $3\frac{4}{5}$ in head; longest ray $3\frac{1}{4}$. Caudal, truncated or slightly rounded posteriorly, $1\frac{2}{3}$ in head. Pectoral large, the upper rays slightly longer than caudal fin. Ventrals very small, without filaments, $2\frac{1}{2}$ in head.

Color in spirits dark bluish green, a black band running from snout to end of dorsal fin, a lighter dusky band from snout to base of caudal, a short light yellowish band along side on a level with lower part of base of pectoral; scale of dark parts with darker spots, of light parts with lighter spots; dorsal and anal with a blackish band along bases, middle of caudal brownish black, pectoral broadly tipped with black, a small black spot on upper part of its base.

Color in life; upper half of body dark green with brick-red reticulations, lower part indigo, a flesh-colored band extending backward from lower part of pectoral; head light greenish olive; caudal greenish blue with large, blackish, brick-red blotch; pectoral bluish with the tip washed with blackish; with flesh-colored spot at base; ventrals indigo. Described from a specimen about 200 millimeters long from Nagasaki.

This most beautiful little fish is common in rock pools off the headlands of Japan. We have many specimens from Tokyo, Misaki, and Nagasaki.

(*Cupido*, the god of Love.)

36. THALASSOMA LUTESCENS (Solander).

? *Labrus lunaris* LINNÆUS, Syst. Nat., 10th ed., p. 283, India; 12th ed., p. 474, and of the copyists.

? *Julis lunaris* CUVIER and VALENCIENNES, Hist. Poiss., XIII, 1837, p. 409; Massuah, Siam.—RICHARDSON, Ichth. China, 1846, p. 260; Canton.—BLEEKER, Atlas Ichth., p. 90, pl. XXXIII, fig. 5, etc.—GÜNTHER, Cat. Fish., IV, 1862, p. 180; Mozambique, Ceylon, Amboyna, Moluccas, Hongkong, Celebes.—? DAY, Fish India, 1885, p. 403; Andamans.

? *Scarus gallus* FORSKÅL, Decr. Anim., 1775, p. 26; Red Sea.

? *Labrus zeylanicus* (Forster) PENNANT, Indian Zoology, 1790, p. 56, pl. XVI; Ceylon.

Labrus viridis BLOCH, Ichthyologia, V, 1785, p. 129, pl. CCLXXXII; Japan.—SCHNEIDER, Syst. Ichth., 1801, p. 246.—LACÉPÈDE, Hist. Nat. Poiss., III, 1801, pp. 354, 520, after Bloch. (Not *Labrus viridis* of Linnæus.)

Julis viridis CUVIER and VALENCIENNES, Hist. Poiss., XIII, 1837, p. 420; Bourbon Island.

? *Julis porphyrocephala* BENNETT, Proc. Comm. Zool. Soc., II, 1830, p. 183.

? *Julis hardwickei* GRAY, Ind. Zool. Pisc., 1830, pl. IX, fig. 1; India.

? *Julis meniscus* CUVIER and VALENCIENNES, Hist. Poiss., XIII, 1837, p. 415; Seychellas, Macao.

Julis mertensi CUVIER and VALENCIENNES, Hist. Poiss., XIII, 1837, p. 421; Ulea.

Labrus lutescens SOLANDER Ms.; Tahiti.

Julis lutescens BENNETT, Zool. Beechey's Voy. Blossom, Fishes, 1839, p. 65, pl. XIX, fig. 2; Tahiti, Riukiu: after Solander.—BREVOORT, Exped. Japan, Fishes, 1856, p. 271, pl. VIII, figs. 3, 4; Nafa, Okinawa Island.

? *Julis celebicus* BLEEKER, Celebes, VIII, 1855, p. 313; Celebes.

Head 3¾ in length; depth 3⅝; depth of caudal peduncle 6⅔; eye 5¼ in head; interorbital space 4; snout 2¾; D. VIII, 13; A. III, 11; scales in lateral series 24; between lateral line and insertion of dorsal 2; between lateral line and insertion of anal 8.

Body compressed, caudal peduncle deep, dorsal outline evenly curved. Teeth in a single row, canine-like in front, growing successively short posteriorly; no posterior canines. Preopercle smooth; opercle with a small rounded flap. Gill rakers on first arch 5 + 10, short, slender, pointed.

Head naked, dorsal and anal with a very narrow sheath, scales on nape and breast not greatly reduced in size. Lateral line complete, abruptly bent downward below base of soft dorsal. Membrane of

dorsal not incised, spines rather strong, the longest contained 3½ times in head; longest ray 2⅔. First anal ray short, very slender, closely apposed to second and hidden beneath the membrane, the third spine 3¾ in head, longest ray 2⅔. Caudal truncate, the upper and lower rays filamentous, middle rays 1½ in head. Upper rays of pectoral somewhat longer than caudal. Anal short.

In spirits the body is light brownish yellow, head bluish white with darker bands; dorsal with a dark spot on membrane following first and second spines, dorsal and anal with a basal band of brownish; pectoral with a large, elongate, brownish spot extending from tip downward toward middle of lower rays, a small black spot on upper edge of axil; a trace of two oblique green bands below the pectoral fin.

Of this species we have a single specimen from Nafa in Okinawa. It agrees fairly with the original figures of *Labrus viridis* and the two figures of *Julis lutescens*, that of Bloch and that of Brevoort being drawn from specimens presumably taken at Nafa, the capital of the Riukiu Islands or Okinawa province. These figures have been placed in the synonymy of the widely diffused *Thalassoma lunare*, but our specimen does not correspond to accounts of that species and it is certain that widely different forms (as *Thalassoma duperreyi and vertical*) have been included under the name of *lunaris*. The name *Labrus viridis* being preoccupied, we adopt the next name in point of date of which we feel sure.

(*lutescens*, growing yellow.)

37. THALASSOMA DORSALE (Quoy and Gaimard).

Julis dorsalis Quoy and Gaimard, Voy. Astrolabe, Poiss., 1834, p. 713, pl. xv, fig. 5; Ile de France.—Cuvier and Valenciennes, Hist. Poiss., XIII, 1837, p. 449; Ile de France.—Bleeker, Amboyna, II, p. 564, Amboyna; Alt. Ichth., 1862, p. 94, pl. xxxiv, fig. 4; Java, Sumatra, Bawean, Celebes, Flores, Amboyna, Banda, New Guinea, etc.—Günther, Cat. Fish., IV, 1862, p. 190; Philippines, Hongkong, Aneitum, Fiji, Ceylon, Mozambique.—Ishikawa, Prel. Cat., 1897, p. 28; Riukiu Islands.

Sparus hardwickei Bennett, Fishes of Ceylon, 1837–1841, pl. xii; Ceylon (not *Julis hardwickei* Gray).

Julis semifasciatus Cuvier and Valenciennes, Hist. Poiss., XIII, 1837, p. 448; Ile de France.

Julis urostigma Bleeker, Sumatra, II, p. 287; Sumatra.

D. VIII, 13; A. III, 11; scales in lateral line 29; in transverse series 3 + 9.

The height of the body equals the length of the head, and is rather more than one-fourth of the total. Caudal with the lobes more or less produced; ventral pointed. Back with six black crossbars, which sometimes extend on the dorsal fin; generally a black longitudinal band on the dorsal; a red band along the side of the tail; head with broad red bands radiating from the eye; anal fin with a more or less

distinct black spot anteriorly, without longitudinal band; a black spot superiorly in the axil (Günther). No distinct black blotch on tip of pectoral.

Of this species a single specimen is in the Imperial Museum of Tokyo, from the Riukiu Islands.

(*dorsalis*, pertaining to the back.)

21. GOMPHOSUS Lacépède.

Gomphosus LACÉPÈDE, Hist. Nat. Poiss., III, 1802, p. 100 (*cæruleus*).

Body rather elongate, compressed, covered with moderate-sized scales, 25 to 30 in the lateral line; lateral line not interrupted; head scaleless; snout abruptly produced, a long tube, which bears the rather long jaws at the end; canines small; no posterior canine; gill membranes attached to the isthmus; fin rays: Dorsal VIII, 13; Anal III or II, 11. Small fishes of brilliant colors, allied to *Thalassoma*, but distinguished from all other *Labridæ* by the prolonged snout. East India and Polynesia.

(γόμφος, a nail.)

a. Color deep blue or bluish green with a yellow bar behind pectoral. ..*tricolor*, 38.
aa. Color gray with black spots, anteriorly rosy, posteriorly blackish; no blue anywhere.....*varius*, 39.

38. GOMPHOSUS TRICOLOR (Quoy and Gaimard).

Gomphosus tricolor QUOY and GAIMARD, Voy. Uranie, Zool., 1824, p. 280, pl. LV, fig. 2; Maui (Sandwich Islands).—BLEEKER, Act. Soc. Indo-Nederl., I, Manado and Macassar, p. 54; Manado (Celebes); Atlas Ich., 1862, p. 85, pl. XXI, fig. 6; Celebes, Sumatra, Amboyna.

Gomphosus cepedianus CUVIER and VALENCIENNES, Hist. Nat. Poiss., XIV, 1839, p. 19; Maui (after Quoy's types), Tahiti, Carolines.

Head 2⅔ in length; depth 3⅓; depth of caudal peduncle 9¼; eye 9¼ in head; interorbital space 6½; snout 1⅓; D. VIII, 13; A. III, 11; scales in lateral series 25; between lateral line and insertion of dorsal 3; between lateral line and insertion of anal 8.

Snout notably long and pointed, the jaws greatly produced and very protractile; mouth wide, the cleft 3⅔ in head. Teeth in a single row, minute, blunt, and close set posteriorly, appearing like a serrated ridge, longer anteriorly, the ones at tips of jaws canine-like; no posterior canines. Preopercle smooth. Gill membranes forming a narrow fold across isthmus. Gill rakers on first arch 8 + 16, short, pointed.

Head naked, dorsal fin with a slight sheath, scales of nape and breast small but not notably reduced. Lateral line abruptly bent downward below soft dorsal fin.

Membrane of dorsal not incised, spines short, the longest about equal to diameter of eye, rays about twice as long. First anal spine very minute, often completely hidden in the membrane, third spine

slightly longer than diameter of eye, the rays somewhat higher than those of the dorsal. Caudal truncate or slightly concave, $2\frac{1}{4}$ in head. Pectoral $2\frac{1}{4}$ in head. Ventrals small. Described from a specimen about 225 millimeters long.

Color in life, from specimens collected at Honolulu, Hawaii, indigo blue with a greenish shade, becoming distinctly green on back and belly; edge of each scale dull violet, the violet shades continuous on belly, restricted on back to a brownish-red spot on each scale, the form and shade of the violet markings varying considerably. Head green above, deep blue on cheek and opercles, light blue on jaws, indigo-blue throat, elsewhere with varying shades of greenish and dark purple, light red streaks radiating from eye. A bright, yellowish-green bar behind gill-opening covering basal fourth of pectoral fin; a jet black spot on base of first rays of pectoral; dorsal reddish brown at base, then bright blue, the upper part golden green; the anal similar to dorsal; caudal bright bluish green, its scaly base dull violet; ventrals dull blue, outer rays black; pectoral golden green at base, otherwise pale violet washed with blackish above; iris green with a scarlet ring.

Of this species we have two large specimens from Nafa, in Okinawa. We can not see that they differ from others from Hawaii. The species is very widely distributed and in life it is brilliantly colored.

(*tricolor*, three-colored.)

39. GOMPHOSUS VARIUS Lacépède.

?*Gomphosus varius* Lacépède, Hist. Nat. Poiss., III, 1801, p. 104, pl. v, fig. 2; Ile de France (described as variegated with red, blue, and golden).—Günther, Cat. Fish., IV, 1862, p. 193; Aneitum, Tahiti.—Ishikawa, Prel. Cat., 1897, p. 28; Miyakoshima, Riukiu Islands.

Gomphosus pectoralis Quoy and Gaimard, Voy. Uranie, Zool., 1824, p. 282; Maui (Hawaii).—Day, Fish. India, about 1885, p. 406, pl. lxxxvi, fig. 6; Andamans.—Bennett, Fish. Ceylon, 1830, p. 3, pl. iii; Ceylon (anal with a yellowish cross-band).

Gomphosus fuscus Cuvier and Valenciennes, Hist. Poiss., XIV, 1839, p. 23; Maui.—Brevoort, Exped. Japan, 1856, p. 272; Riukiu.

Gomphosus melanotus Bleeker, Kokos, p. 457; Kokos; Atlas Ichth., I, 1862, p. 87, pl. xxi, fig. 3; Kokos, Java.—Günther, Cat. Fish., IV, 1862, p. 193; East Indies.

Head $2\frac{3}{5}$ in length; depth $3\frac{3}{4}$; depth of caudal peduncle $2\frac{1}{5}$; eye $6\frac{1}{5}$ in head; snout $1\frac{3}{4}$; interorbital space $6\frac{1}{5}$; D. VIII, 13; A. III, 11; scales in lateral series 25; between lateral line and insertion of dorsal 3; between lateral line and insertion of anal 8.

This species is very like *G. tricolor* except in coloration, it having none of the brilliant hues of that species.

Color gray, or grayish brown, the lower anterior parts suffused with rose color, the body growing almost black posteriorly; scales of upper parts, each with a brownish-black bar, represented on sides of belly by

a round or elongate spot; 2 dark bands radiating from posterior part of orbit, an indistinct bar extending forward from eye; dorsal dark like back, very narrowly edged with white; anal dark with a round, white spot between each ray, the spots growing smaller posteriorly, fin narrowly edged with white; caudal black with a white edge about as wide as diameter of pupil; pectoral plain, a small spot on upper edge of axil; outer rays of ventrals blackish.

Of this species we have examined one specimen in the Imperial Fisheries Institute of Japan, taken at Kagoshima in Kiusiu. It occurs in Riukiu and we have many specimens from the Hawaiian Islands.

(*varius*, varied.)

22. CIRRHILABRUS Schlegel.

Cirrhilabrus Schlegel Fauna Japonica, Poiss., 1846, p. 167 (*temmincki*).
Cheilinoides Bleeker, Natuurk. Nederl. Ind., II, 1851, p. 71 (*cyanopleura*).

Body compressed, oblong, covered with large scales, 20 to 25 in the lateral line; lateral line interrupted; forehead not elevated nor truncate; cheeks and opercles with imbricated scales; preopercle serrated; teeth in one series, with canines anteriorly; no posterior canine. D. XI, 9; A. III, 9. Ventrals much produced (*Cirrhilabrus*) or short (*Cheilinoides*).

Small fishes, brilliantly colored, of the East Indian seas.

(*cirrus*, a filament; *labrus;* from the long ventrals.)

40. CIRRHILABRUS TEMMINCKI (Bleeker).

Cirrhilabrus Schlegel Fauna Japonica, Poiss., 1846, p. 167; Nagasaki.
Cirrhilabrus temmincki Bleeker, Verh. Bat. Gen., XXV, Japan, 1852, p. 17; Nagasaki.—Günther, Cat. Fish., IV, 1862, p. 124, after Schlegel.

Head $3\frac{2}{5}$ in length; depth 3; depth of caudal peduncle 2; eye $4\frac{1}{2}$ in head; snout $3\frac{2}{5}$; interorbital space $3\frac{1}{2}$; D. XI, 9; A. III, 9; scales in lateral series 23; between lateral line and insertion of dorsal 2; between lateral line and insertion of anal 7; 2 rows on cheek.

Body notably compressed; the caudal peduncle short and deep; forehead low, broad, the interorbital area slightly convex; dorsal outline somewhat elevated above pectorals. Snout short, sharp, jaws equal, lips very thin. Teeth in a single row laterally, very small; an outer row represented by 6 strong canines on the upper jaw and 2 on the lower; of the upper canines the middle pair are smallest and project forward, the others are larger, fang-like, and strongly curved backward; no posterior canines present. Gill-rakers short, pointed. Edge of preopercle finely serrated. Scales on opercle large, imbricate; on body large, those on breast not greatly reduced; a row of very large pointed scales forming a basal sheath on dorsal and anal; caudal with a conspicuous basal sheath, the 3 posterior scales elongate and greatly enlarged, a slender, pointed scale above base of ventral. Lateral

line incomplete, extending along upper part of body, parallel with back, ending below base of sixth or seventh dorsal ray, beginning again on the third row of scales below and extending along middle of caudal peduncle. Membrane of dorsal not incised, spines slender, the longest $2\frac{1}{5}$ in head. Posterior rays longest, $1\frac{1}{2}$ in head. First anal spine short, not concealed, the third contained 4 times in head, last rays slightly longer than those of dorsal. Caudal rounded posteriorly, somewhat shorter than head. Pectorals about $1\frac{1}{2}$ in head. Ventrals falcate, extremely long, reaching beyond posterier end of anal base.

Color in spirits brownish, each scale with a lighter edging, a yellowish white area extending from snout above lateral line to base of caudal fin, a narrow branch of same extending from snout below eye to edge of opercle, a narrow median band of the body color from snout to origin of spinous dorsal; an indistinct, narrow, zigzag band with a round, pearly white spot on each angle, along middle of pos-

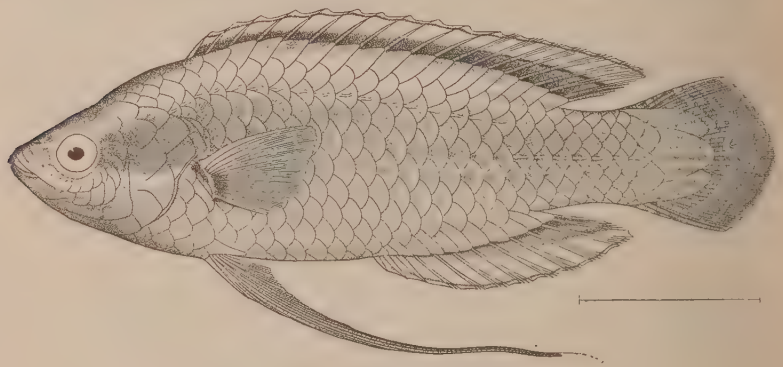

FIG. 10.—CIRRHILABRUS TEMMINCKI.

terior half of body; a longitudinal dark band on dorsal and anal at outer edge of basal sheath, a subterminal black line along edges of fins; caudal dusky with vertical, wavy bands of pale pearly white; an indistinct dusky blotch at base of pectoral.

A male specimen about 100 millimeters long is described above. The coloration of the females is plainer, a row of small pearly spots extending along body above lateral line, the lower parts of body light; dorsal and anal with dark band present, though not conspicuous, the subterminal line absent, caudal plain, the pectoral with a very indistinct dusky blotch at base. The ventrals are filamentous, though not reaching anal opening.

Color in life.—Back crimson in males, side of head crimson except a pearly area behind eye, lower half of body abruptly pearly blue, middle of breast deep blue, belly grayish. Dorsal and anal crimson, the base blackish blue; caudal blue, pectoral pale grayish, ventral bluish gray, base of ventral with a bluish cross streak.

This surpassingly beautiful little fish is rather rare about rocky

headlands in Japan. Our specimens, six in number, are from Wakanoura. The very long ventrals at once distinguish it from all other Japanese labroids.

(Named for Prof. C. J. Temminck, of Leyden.)

23. CHEILINUS Lacépède.

Cheilinus LACÉPÈDE, Hist. Nat. Poiss., III, 1802, p. 529 (*trilobatus*).
Urichthys SWAINSON, Nat. Hist. Fishes, II, 1839, p. 224 (*lunulatus*).
Crassilabrus SWAINSON, Nat. Hist. Fishes, II, 1839, p. 225 (*undulatus*).
Thalliurus SWAINSON, Nat. Hist. Fishes, II, 1839, p. 230 (*blochi-chlorurus*).
Oxycheilinus GILL, Proc. Ac. Nat. Sci. Phila., 1862, p. 143 (*arenatus*).

Body oblong, compressed, covered with large scales, 20 to 25 in lateral line; lateral line interrupted; cheeks with two series of large scales; opercles scaly; preopercle entire; teeth in one series, two canines in front of each jaw, not bent backward nor outward; no posterior canine; lower jaw not produced backward; lips thick; dorsal spines subequal. Dorsal IX, 10 (rarely X, 9); anal III, 8. Fishes of Polynesia and the East Indies, usually brightly colored, the shades chiefly red and green.

(χεῖλος, lip.)

41. CHEILINUS OXYRHYNCHUS Bleeker.

MOCHINOUWO (RICE-BALL-FISH).

Cheilinus oxyrhynchus BLEEKER, Atlas Ichth., 1862, p. 73, pl. XXVIII, fig. 2; Celebes, Amboyna, Batjan.—GÜNTHER, Cat. Fish., IV, 1862, p. 133; East Indies.
Cheilinus sp., No. 514 (*Mochinouwo*) ISHIKAWA, Prel. Cat., 1897, p. 29; Riukiu Archipelago.

Head $1\frac{4}{5}$ in length; depth $3\frac{2}{5}$; depth of caudal peduncle 7; eye 5 in head; interorbital space $5\frac{1}{2}$; snout $2\frac{2}{5}$; D. IX, 10; A. III, 8; scales in lateral series 20; between lateral line and insertion of dorsal 2; between lateral line and insertion of anal 6; 2 rows on cheek.

Body compressed, caudal peduncle deep; head large, pointed; contour from snout to dorsal almost straight; snout large, mouth wide; lower jaw slightly projecting, lips thick, maxillary broad and heavy. Teeth in a single row, large, obtusely pointed, 2 strong, straight, widely separated canines in each jaw, 2 or 3 rudimentary canines between the upper pair, no posterior canines. Edge of preopercle serrate. Gill-rakers on first arch 5 + 8, long, compressed, pointed, widely spaced. Scales of body large, not reduced in size on nape and breast; a narrow basal shield of pointed scales on base of caudal enlarged; imbricate scales on opercle. Lateral line interrupted, extending in a straight line to a point below end of base of caudal, beginning again on the second row of scales below, 3 scales in advance of where it ended, and extending along middle of caudal peduncle. Dorsal spines rather strong, growing larger posteriorly, the longest $3\frac{2}{3}$ in head, longest ray 3 in head. First anal spine large, close to the second, the third longest,

3 in head, rays slightly longer; fin membranes very thin and transparent, notched between the spines. Caudal rounded, its length $1\frac{2}{5}$ in head. Ventrals reaching half-way between their base and insertion of anal. Upper rays of pectoral longest, $2\frac{1}{2}$ in head.

Color in spirits plain throughout, except a small brownish blotch at base of anterior part of spinous dorsal and across basal half of ventrals.

According to Günther and Bleeker the body is yellowish olive, the snout unmarked, reticulated brown lines on hinder half of head, on body, and on soft parts of vertical fins; subopercle covered by several brown lines; two irregular blackish blotches on tail; dorsal with a blackish spot between first and second spines.

Of this species we have an example, very badly faded, from the Riukiu Islands, one of three numbered 514 in the Imperial Museum at Tokyo. Only the dark spot on front of dorsal and a dark shade across ventrals remain of its original coloration. It agrees in form with *oxyrhynchus* of Bleeker, and without much doubt belongs to that species.

(ὀξύς, sharp; ῥύγχος, snout).

24. INIISTIUS Gill.

Iniistius Gill, Proc. Ac. Nat. Sci. Phila., 1862, p. 143 (*pavo*).
Xyrichthys Bleeker, Atlas Ichth., 1862, p. 149 (*pavo*), not of Cuvier.

Body compressed, oblong, covered with large thin scales, about 26 in the lateral line; head scaleless or very nearly so; head short and deep, the upper and anterior outline compressed to a sharp edge; profile almost vertical; eye small, placed high. Dorsal spines 9; the fin rays, D. II, 7, 12; A. III, 12; first two dorsal spines detached from the others and inserted on or close behind the occiput; lateral line interrupted, extending on the second row of large scales below the dorsal sheath; canines 2 in front of each jaw; no posterior canines. This genus contains some 5 or 6 species, chiefly of the western Pacific. They are similar in most respects to the species of *Xyrichthys*, differing chiefly in having the two anterior spines of the dorsal fin produced, separated from the others, and placed as a separate fin on the nape.

(*ἰνίον*, nape; *ἱστίον*, sail; in allusion to the first dorsal fin on the nape.)

42. INIISTIUS DEA (Schlegel).

TEISU (HUSBAND); CHIDAI (BROAD PERCH); BENI KUSABÉ (RED WEDGE FISH).

Xyrichthys dea Schlegel, Fauna Japonica, Poiss., 1846, p. 171, pl. LXXXVII; Nagasaki.
Novacula dea Bleeker, Act. Soc. Sci. Indo-Nederl., III, Japan. IV, p. 20; Nagasaki.—Günther, Cat. Fish., IV, 1862, p. 175; Nagasaki.—Steindachner, Fische Japans, IV, 1887, p. 20; Tokyo, Kochi.—Karoli, Prodr. Pisc.

Asiæ. Orient., 1882, p. 29; Yokohama.—Ishikawa, Prel. Cat., 1897, p. 28; Boshu.

Iniistius dea Jordan and Snyder, Check List, 1901, p. 88; Yokohama.

Xyrichthys puniceus Richardson, Ichth. China, 1846, p. 261; Canton.

Head $3\frac{2}{5}$ in length; depth $2\frac{1}{2}$; depth of caudal peduncle $1\frac{2}{3}$; eye $6\frac{1}{3}$ in head; interorbital space $5\frac{1}{2}$; snout measured from eye to tip of jaw $1\frac{2}{3}$; D. II, VII, 12; A. III, 11; scales in lateral series 23; between lateral line and dorsal fin 2; between lateral line and insertion of anal 10.

Body deep, compressed, caudal peduncle deep, dorsal contour elevated, anterior profile almost vertical, ventral contour evenly and gently curved. Eye small, high in head, near occiput, the suborbital area very broad, a narrow, cutaneous flap above and below eye. Snout blunt with a sharp ridge anteriorly. Mouth horizontal, a shallow furrow extending backward from the angle, lower lip narrow, thin, pendent, jaws equal. Teeth in a single row in each jaw, short, pointed, not coalesced at bases, 2 strong, curved canines at tip of each jaw, no posterior canines. Preopercle entire; opercle with a broad flap. Gill-rakers on first arch 6+10, those near ends very small; the middle ones rather thick, pointed. Head naked, scales slightly smaller on breast, not reduced in size on nape, dorsal and anal without basal sheath, small scales on base of caudal fin. Lateral line sharply curved anteriorly, interrupted below base of anal fin. Two anterior spines of dorsal united together by an incised membrane, separated in the following ones by an interspace, the first spine filimentous, somewhat higher than length of head; spines slender, 10 to 12 in second series, about $2\frac{1}{4}$ in head. Anal spines very slender, the rays a little shorter than those of the dorsal. Caudal rounded, $1\frac{1}{6}$ in head. Outer rays of ventrals filimentous, reaching a little beyond first anal spine.

Color in spirits, yellowish, dusky along back; pearly white spots or blotches on 1 or 2 rows of scales below base of dorsal; a deep black spot on the scale above the sixth or seventh one of the lateral line; dorsal fin with bluish or dusky reticulations; anal with a pearly blue band along the base and an indistinct dusky line along the middle; caudal with 3 faint vertical stripes; pectorals and ventrals with traces of pearly blue.

Color in life: Crimson, middle line of head bright sky blue, black spot of side bordered with blue; dorsal violet with crimson edges, anal blue at base, the outer parts dull orange, caudal crimson, pectorals pink, ventrals dull red.

Here described from specimens about 250 millimeters long.

This large and beautiful species is rather common in southern Japan, occurring about rocks. Our specimens are from Tokio, Misaki, Wakanoura, and Nagasaki.

The two sexes are similar in color, but in one male specimen the lateral spot is obsolete.

(*Dea*, a goddess.)

Family III. SCARIDÆ.

THE PARROT FISHES.

Body oblong, moderately compressed, covered with large cycloid scales as in the Labridæ. Mouth moderate, terminal. Teeth in the jaws more or less coalescent, at least at base; lower pharyngeals much enlarged, united in a concave or spoon-shaped body, their teeth broadest transversely and truncate, arranged in mosaic; dorsal continuous, its formula usually IX, 10; anal rays II, 9; 23 to 25 scales in the lateral line; vertebræ about 11+14=25. Sexes similarly colored, the coloration almost always brilliant; fin rays essentially the same throughout the group, the squamation varying little except on the head. Species of the tropical seas, especially abundant about coral reefs. Herbivorous fishes, often of large size, not valued as food, the flesh being soft and pasty. The species in the various genera are very closely related, being distinguished chiefly by the coloration and the dentition, both series of characters being highly specialized. We begin the group with the most generalized genus, the one nearest the Labroid ancestors of the *Scaridæ*.

SPARISOMATINÆ:

a. Lower pharyngeal broader than long, flattish or basin-shaped; gill membranes broadly joined to the isthmus, not forming a fold across it; lateral line subcontinuous; scales about head few and large, those on the cheek in 1 row; lower jaw projecting; teeth whitish or rosy.

b. Dorsal spines flexible; teeth more or less distinct, at least anteriorly.

c. Teeth in each jaw in 3 or 4 series, all imbricated in quincunx order on the dental plate, to which they are adnate by the posterior face; cutting edge of each jaw formed by teeth ..... *Calotomus*, 25.

SCARINÆ:

aa. Lower pharyngeal spoon-shaped, much longer than broad; teeth of jaws fully coalesced, each jaw divided by a distinct median suture; gill membranes forming a fold across the isthmus; dorsal spines flexible; lateral line interrupted behind, beginning again lower down on the peduncle of the tail; scales about head rather numerous, those on cheeks in 2 or more series. *Scarus*, 26.

25. CALOTOMUS Gilbert.

Calotomus GILBERT, Proc. U. S. Nat. Mus., 1890, p. 70 (*xenodon*).

Teeth distinct, equal, imbricated in regular oblique rows in both jaws, wholly concealing the dental plates, to the anterior edge of which they are affixed. Cutting edge of each jaw formed by the outer teeth, the dental plate not reaching the edge, and visible only from within. Lips double for a short distance only. Scales of cheek in one row; lateral line continuous; bases of dorsal and anal with scaly sheaths; dorsal spines 9, soft and flexible; gill membranes broadly joined to the isthmus. Large species of the Pacific, allied to *Cryptotomus* (*Callyo-*

don Cuvier and Valenciennes, not *Calliodon* Bloch and Schneider), but differing in the arrangement of the teeth.

(*καλός*, beautiful; *τομός*, cutting.)

43. CALOTOMUS JAPONICUS (Cuvier and Valenciennes).

BUDAI; IGAMI.

Callyodon japonicus Cuvier and Valenciennes, Hist. Poiss., XIV, 1839, p. 294, pl. cccccvi; Japan, Coll. Langsdorff.—Schlegel, Fauna Japonica, Poiss., 1846, p. 174, pl. lcccix, Nagasaki.—Bleeker, Verh. Bat. Gen., XXVI, Nalez, Japan, p. 115; Nagasaki.—Günther, Cat. Fish., IV, 1862, p. 215; Nagasaki.—Karoli, Prodr. Pisc. As. Or., 1882, p. 29; Yokohoma, Kobe.—Steindachner and Döderlein, Fische Japans., IV, 1887, p. 21; Tokyo.—Ishikawa, Prel. Cat., 1897, p. 28; Tokyo, Osaki, Riukiu Islands.

Callyodon rubiginosus Cuvier, Règne Anim. Ill. Poiss., pl. xci, fig. 2.

Head 3½ in length; depth 2⅔; depth of caudal peduncle 7; eye 4⅔; snout 2; interorbital space 3⅔; D. IX + 10; A. III, 9; scales in lateral series 21; between lateral line and insertion of dorsal 2; between lateral line and insertion of anal 6.

Body deep, heavy; caudal peduncle narrow, subcylindrical. Head short, rather blunt, interorbital space convex or flattish; jaws equal; lips double posteriorly. Teeth about equal in size, separate, the tips and edges free, those in anterior half of jaws arranged in series of oblique rows, 4 or 5 in a row; upper jaws with 3 or 4 large, curved, conical teeth just posterior to the oblique rows; posterior half of jaws with a single row of teeth, those above very small, those below as large as the front teeth. Gill-rakers on first arch 10 or 12, rather stumpy, pointed. Angle of preopercle with a large thin flap. Operclewith a large soft flap. Scales on cheeks in a single row of 4, those on opercle large; 4 scales deeply notched posteriorly, between occiput and first dorsal spine, a row of narrow scales forming a sheath along base of dorsal, very large scales on base of caudal. Lateral line complete, abruptly bend downwards below base of soft dorsal. Dorsal spines high, slender, with soft tips, the longest 2½ in head, longest ray 1½. Anal spines weak, longest ray 2⅔ in head. Caudal rounded, 1⅓ in head. Ventrals reaching half way between their base and first anal ray. Pectoral 1¼ in head.

Color olive-brown, belly olive-green and brick-red, chin plain or clouded with vitriol-green, the amount of red and green extremely variable. In spirits the bright colors nearly all disappear.

This species is rather common in Japan and reaches a considerable size. It is subject to considerable variation in color, especially in the amount of reddish and greenish shading. It lives in rocky places in shallow water and was taken by us at Tokyo, Yokohama, Misaki, Wakanoura, and Nagasaki.

26. SCARUS Forskål.

Callyodon Gronow, Museum Ichthyol., II, 1764, p. 8 (*croicensis*), nonbinomial.
Scarus Forskål, Descr. Animal, etc., in Orient Observ., 1775, p. 25 (*psittacus*, etc.); not of Gronow, 1764, which (nonbinomial) = *Labrus* Linnæus.
Calliodon Bloch and Schneider, Syst. Ichthyol., 1801, p. 312 (*lineatus* = *croicensis*).
Hemistoma Swainson, Class'n Fishes, etc., II, 1839, p. 226 (*reticulatus* Swainson = *pepo* Bennett) (= *Scarus*).
Petronason Swainson, Class'n Fishes, etc., II, 1839, p. 226 (*psittacus*) (= *Scarus*).
Erychthys Swainson, Class'n Fishes, etc., II, 1839, p. 226 (*croicensis*).
Chlorurus Swainson, Class'n Fishes, etc., II, 1839, p. 227 (*gibbus*) (= *Scarus*).
Callyodon Gronow, Systema, Ed. Gray, 1854, p. 83 (*lineatus*, etc.).
Pseudoscarus Bleeker, Vet. Acad. Wet. Amst. Scar., XII, 1861, p. 3 (*microrhinos*) (teeth blue; posterior canine present).
Scarus Jordan and Gilbert, Synopsis, 1883, p. 938 (*psittacus*).
Calliodon Jordan, Proc. U. S. Nat. Mus., 1886, p. 591 (*croicensis*).
Loro Jordan and Evermann, Check List, Fish North Am., 1896, p. 418, (*guacamaia*) (teeth blue; no posterior canines).

Lower pharyngeals spoon-shaped, ovate-oblong, transversely concave; teeth in each jaw fully coalescent, appearing as tessellations on the surface; jaws with distinct median suture; the edges of jaw even, the teeth whitish, rosy, or green in color. Upper pharyngeals each with 2 rows of teeth; gill membranes scarcely united to the narrow isthmus, across which they form a broad fold; dorsal spines flexible, scarcely different from the soft rays; upper lip laterally double, the interior fold becoming very narrow or obsolete mesially; lower jaw included in the closed mouth; lateral line interrupted posteriorly, beginning again on the next series of scales below; tubes of lateral line scarcely branched; scales on cheek in 2 to 4 rows; scales in front of dorsal on median line 6 to 8. Dorsal rays IX, 10; anal III, 9 in all species; scales $\frac{1}{2}$–24–6. Body robust. Species very numerous, mostly of large size, found in nearly all tropical seas.

This group naturally divides into two subgenera, *Scarus*, with pale teeth, and *Pseudoscarus*, with the teeth specialized and deep blue in color. Each group may be further divided as to the presence or absence of posterior canines, although these structures are often lost in the species normally possessing them.

(σκάρος, *Scarus*, ancient name of *Sparisoma cretense*, said by Rondelet to be from σκαιρῶν, to pasture.)

a. Teeth whitish or rosy gray.
b. Scarus. Upper jaw with one or two posterior canines.
c. Head with yellow streaks; a black ocellus at base of 4th dorsal spine; scales of side with white dots; fins with yellow streaks or markings; cheeks with $2\frac{1}{2}$ series of scales ..... *globiceps*, 44.
aa. Teeth deep blue.
d. Loro. Upper jaw without canines; color dark gray; the fins chiefly deep blue and blackish; cheeks with 2 series of scales ..... *ovifrons*, 45.

44. SCARUS GLOBICEPS Cuvier and Valenciennes.

Scarus globiceps Cuvier and Valenciennes, Hist. Poiss., XIV, 1839, p. 179; Tahiti.—Jenyns, Voyage Beagle. Fish., 1842, p. 106; Tahiti.

Pseudoscarus globiceps Günther, Cat. Fish., IV, 1862, p. 224; Tahiti.—Steindachner and Döderlein, Fische Japans, IV, 1887, p. 21; Oshima, near Misaki.

This species is thus described by Günther from a specimen from Tahiti: Two series on scales on the cheek and one or two scales on the lower opercular limb; the middle series composed of six scales. Upper lip broad with the inner portion well developed; jaws whitish; a strong pointed horizontal tooth at the corner of the upper jaw, and a pair of similar teeth at the corner of the lower. Teeth of moderate size. Dorsal spines subequal in length, stout, with the top flexible; caudal emarginate; fourteen pectoral rays.

Greenish olive above, the lower parts of the head yellowish to an oblique line running from axil through the lower margin of the orbit and the upper lip. A curved yellow band passes from one eye across the snout to the other; short streaks radiate from the hinder and upper part of the orbit. * * * The dark colored portion of the head edged with yellow and dotted with whitish. Each scale of the body with four or five round whitish dots. A small black ocellus on the scale covering the base of the fourth dorsal spine. Dorsal fin yellowish, with two fine undulate violet lines, one along the base and the other near the margin; a series of acelli along the middle of the soft portion. Anal yellow, with a single line below the middle; caudal with a yellow, dark-edged band along each lobe; pectoral blackish at the root, and with an elongate-ovate dark spot on its upper half. (Günther.)

This species, unknown to us, is described by Steindachner from the outlying volcanic island of Oshima (Vries Island) off Misaki and Izu.

(*globus*, globe; *ceps*, head.)

45. SCARUS OVIFRONS[1] Schlegel.

AOBUDAI (BLUE SCARUS).

Scarus ovifrons Schlegel, Fauna Japonica, 1846, p. 173, pl. lccvii; Bay of Jeddo (Tokyo).

Pseudoscarus ovifrons Steindachner and Döderlein, Fische Japans, IV, 1887, p. 21; Tokyo.—Ishikawa, Prel. Cat., 1897, p. 28; Tokyo.

Pseudoscarus schlegeli Steindachner, Fische Japans, IV, 1887, p. 21; Tokyo.

Head 3⅓ in length; depth 2⅔; depth of caudal peduncle 7; eye 9 in head; interorbital space 2½; snout 2; D. IX, 10; A. III, 9; scales in

[1] Karoli (Prodr. Pisc. As. Or., 1882, p. 29) records *Scarus lacerta* Cuvier and Valenciennes under the name of *Pseudoscarus aruginosus*, from Yokohama. This species is found in Formosa, but the Japanese locality is probably an error of identification, as are numerous others of the same author.

lateral series 23; between lateral line and insertion of dorsal 2; between lateral line and insertion of anal 7.

Body robust, the caudal peduncle rather narrow; head large, a fatty hump on upper part of snout; interorbital area high, convex; eye very small; midway between tip of snout and edge of opercular flap. Teeth completely coalesced, the cutting edge slightly serrated, a median division separating the jaws; lips thick, not closing far over the teeth, leaving a large exposed beak. Gill-rakers small, slender, very numerous and close together like the teeth of a comb. Scales on cheek in 2 rows, those on opercle large, in about 2 rows; a row of narrow scales about half as large as those of body along base of dorsal and anal fins, caudal with large scales on the base. Dorsal spines rather slender, the membrane notably thickened, especially about the outer parts of the spines; longest spine $2\frac{1}{3}$ in head; longest ray $2\frac{2}{3}$. Anal spines weak, their tips united in a thickened ridge of the membrane, the rays equal in height to those of the dorsal. Caudal truncate, the membrane thickened along the upper and lower edges, its length $1\frac{3}{5}$ in head. Pectoral equal to caudal in length. Ventrals extending two-thirds of distance between their bases and the vent, the membrane greatly thickened along the outer edges.

Color in alcohol, deep brownish olive; the scales broadly edged with a lighter shade which is largely blue in life. The teeth deep blue-green, growing whitish along the cutting edge; dorsal, caudal, and anal fins blackish, broadly edged with bright blue-green; pectorals plain blackish.

Of this great blue Parrot fish one large specimen was taken by us, at Nagasaki. It is evidently the original of Schlegel's figure, and Steindachner's description accords with it in almost every detail. The upper lip does not, however, nearly cover the upper jaw.

(*ovis*, sheep; *frons*, forehead.)

RECAPITULATION.

Family I. POMACENTRIDÆ.

1. *Amphiprion* Schneider.

1. *frenatus* Brevoort; Nafa, Shimoda
2. *polymnus* Linnæus.

2. *Chromis* Cuvier.

3. *notatus* (Schlegel); Tokyo, Misaki, Enoshima, Onomichi, Kobe, Wakanoura, Hiroshima, Nagasaki, Tsushima.

3. *Pomacentrus* Lacépède.

4. *violascens* Bleeker; Yokohama.
5. *cœlestis* Jordan and Starks; Wakanoura.
6. *tripunctatus* Cuvier and Valenciennes; Shimoda.

4. *Chrysiptera* Swainson.

7. *melas* (Kuhl and Van Hasselt).
8. *bonang* (Bleeker); Misaki.

5. *Glyphisodon* Lacépède.

9. *saxatilis* (Linnæus); Misaki, Yogashima, Enoshima, Shimoda, Formosa.
10. *curaçao* (Bloch).
11. *sordidus* (Forskål); Misaki, Formosa.

Family II. LABRIDÆ.

6. *Chœrops* Rüppell.

12. *azurio* Jordan and Snyder; Tokyo, Misaki, Wakanoura, Kobe, Hakata, Nagasaki, Formosa.
13. *anchorago* (Bloch).

7. *Lepidaplois* Gill.

14. *axillaris* (Bennett); Nafa.
15. *perditio* (Quoy and Gaimard); Wakanoura.

8. *Verreo* Jordan and Snyder.

16. *oxycephalus* (Bleeker); Tokyo.

9. *Semicossyphus* Günther.

17. *reticulatus* (Cuvier and Valenciennes); Tokyo, Misaki, Wakanoura, Onomichi, Hakata.

10. *Duymœria* Bleeker.

18. *flagellifera* (Cuvier and Valenciennes); Tokyo, Misaki, Wakanoura, Kobe, Nagasaki, Formosa.

11. *Pseudolabrus* Bleeker.

19. *japonicus* (Houttuyn); Tokyo, Misaki, Kobe, Hiroshima, Tsuruga, Hakata, Nagasaki, Tsushima.
20. *gracilis* (Steindachner); Misaki, Nagasaki.

12. *Anampses* Cuvier.

21. *geographicus* Cuvier and Valenciennes.

13. *Stethojulis* Günther.

22. *psacas* Jordan and Snyder; Nafa.
23. *strigiventer* Bennett.
24. *terina* Jordan and Snyder; Misaki, Boshu.
25. *trossula* Jordan and Snyder; Misaki, Wakanoura.

14. *Hemigymnus* Günther.

26. *melapterus* (Bloch).
27. *fasciatus* (Thunberg).

15. *Güntheria* Bleeker.

28. *trimaculata* (Quoy and Gaimard).

16. *Halichœres* Rüppell.

29. *pœcilopterus* (Schlegel); Aomori, Matsushima, Tokyo, Misaki, Wakanoura, Kobe, Onomichi, Hiroshima, Tsuruga, Nagasaki.
30. *bleekeri* (Steindachner and Döderlein); Tokyo, Misaki, Kobe, Onomichi, Hiroshima, Nagasaki.
31. *tremebundus* Jordan and Snyder; Hiroshima, Nagasaki, Misaki, Wakanoura.

17. *Coris* Lacépède.

32. *aygula* Lacépède; Wakanoura.

18. *Julis* Cuvier.

33. *formosa* (Bennett).

19. *Cheilio* Lacépède.

34. *inermis* (Forskål); Nafa.

20. *Thalassoma* Swainson.

35. *cupido* (Schlegel); Tokyo, Misaki, Nagasaki.
36. *lutescens* (Solander); Nafa.
37. *dorsale* (Quoy and Gaimard).

21. *Gomphosus* Lacépède.

38. *tricolor* (Quoy and Gaimard); Nafa.
39. *varius* Lacépède; Kagoshima.

22. *Cirrhilabrus* Schlegel.

40. *temminckii* (Bleeker); Wakanoura.

23. *Cheilinus* Lacépède.

41. *oxyrhynchus* Bleeker; Riukiu.

24. *Iniistius* Gill.

42. *dea* (Schlegel); Tokyo, Misaki, Wakanoura, Nagasaki.

Family III. SCARIDÆ.

25. *Calotomus* Gilbert.

43. *japonicus* (Cuvier and Valenciennes); Tokyo, Yokohama, Misaki, Wakanoura, Nagasaki.

26. *Scarus* Forskål.

44. *globiceps* Cuvier and Valenciennes.
45. *ovifrons* Schlegel; Nagasaki.